

# 11

U.S. History  
History-Social  
Science Standard  
11.5.7.



Teacher's Edition  
California Education and the Environment Initiative



## Mass Production, Marketing, and Consumption in the Roaring Twenties

## **California Education and the Environment Initiative**

Approved by the California State Board of Education, 2010

### **The Education and the Environment Curriculum is a cooperative endeavor of the following entities:**

California Environmental Protection Agency  
California Natural Resources Agency  
Office of the Secretary of Education  
California State Board of Education  
California Department of Education  
California Integrated Waste Management Board

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### **Key Partners:**

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**Arnold Schwarzenegger**  
Governor of California

As a Californian and as Governor, I am excited for what the future holds for our Golden State. Much of this positive outlook comes from knowing that our young people are full of promise. They are tomorrow's leaders, and with the learning and growth they experience in your classroom, they will be ready for the challenges and opportunities that will be theirs.

This is why I am pumped up about the Education and the Environment Initiative curriculum. This nation-leading initiative will not only prepare the next generation to tackle the environmental issues of their day, it will also get your students ready to excel in California's growing green economy. In addition, it furthers our commitment to maintaining the very highest academic standards.

We live in a place of rich natural beauty and resources that we rely on for our well-being, our prosperity and our lives. My administration and many other groups and individuals are working hard to protect our environment, and one day, that responsibility will belong to your students. I appreciate your role in their preparation. Thanks to your outstanding dedication as a teacher, and with the aid of this fantastic curriculum, they will be ready to shoulder these responsibilities and find great success as they continue building a more sustainable future.



**Linda S. Adams**  
Secretary for  
Environmental Protection

I am pleased to present the California Environmental Protection Agency's Education and the Environment Initiative curriculum for integration into your science and history-social science instruction.

This comprehensive, teacher-tested curriculum will bring environment-based education into our classrooms at a time when protecting the environment is paramount. Developed in partnership with the State Board of Education, it's gone through rigorous review and approval, and is based on California education standards. I hope that you and your students find its lessons valuable and engaging.

As we move toward a more clean, green economy, we'll need the next generation of leaders to value sustainable principles and work to find solutions to today's environmental challenges. Thank you for your role in protecting California's future.



**Jack O'Connell**  
Superintendent of  
Public Instruction

Students in our classrooms today will be responsible for making decisions that influence the health of the world in which we live.

The Education and the Environment Initiative curriculum provides the foundation to prepare students to be informed, environmentally conscious, decision makers. This curriculum will help students gain an understanding of the interconnectedness of the systems of our planet.

The lessons integrate California's environmental and academic content standards to help students put into context what they are learning. I hope that you will use the EEI curriculum to help students become knowledgeable members of the world community who are inspired and ready to find solutions to global challenges we may face.

# California's Environmental Principles



The State of California's Environmental Principles and Concepts were approved in 2004 under a law referred to as the California Education and the Environment Initiative (EEI). The law called for the development of Environmental Principles and Concepts that are compatible with the State's academic content standards and, as such, would become a formal part of California's K-12 education system. The EEI Curriculum, which this unit is part of, is designed to help students simultaneously achieve mastery of selected academic content standards and California's Environmental Principles and Concepts.

## Principle I

### **People Depend on Natural Systems**

The continuation and health of individual human lives  
and of human communities and societies  
depend on the health of the natural systems that provide essential goods  
and ecosystem services.

## Principle II

### **People Influence Natural Systems**

The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems  
are influenced by their relationships with human societies.

## Principle III

### **Natural Systems Change in Ways that People Benefit from and Can Influence**

Natural systems proceed through cycles  
that humans depend upon, benefit from and can alter.

## Principle IV

### **There are no Permanent or Impermeable Boundaries that Prevent Matter from Flowing Between Systems**

The exchange of matter between natural systems and human societies  
affects the long-term functioning of both.

## Principle V

### **Decisions Affecting Resources and Natural Systems are Complex and Involve Many Factors**

Decisions affecting resources and natural systems  
are based on a wide range of considerations  
and decision-making processes.





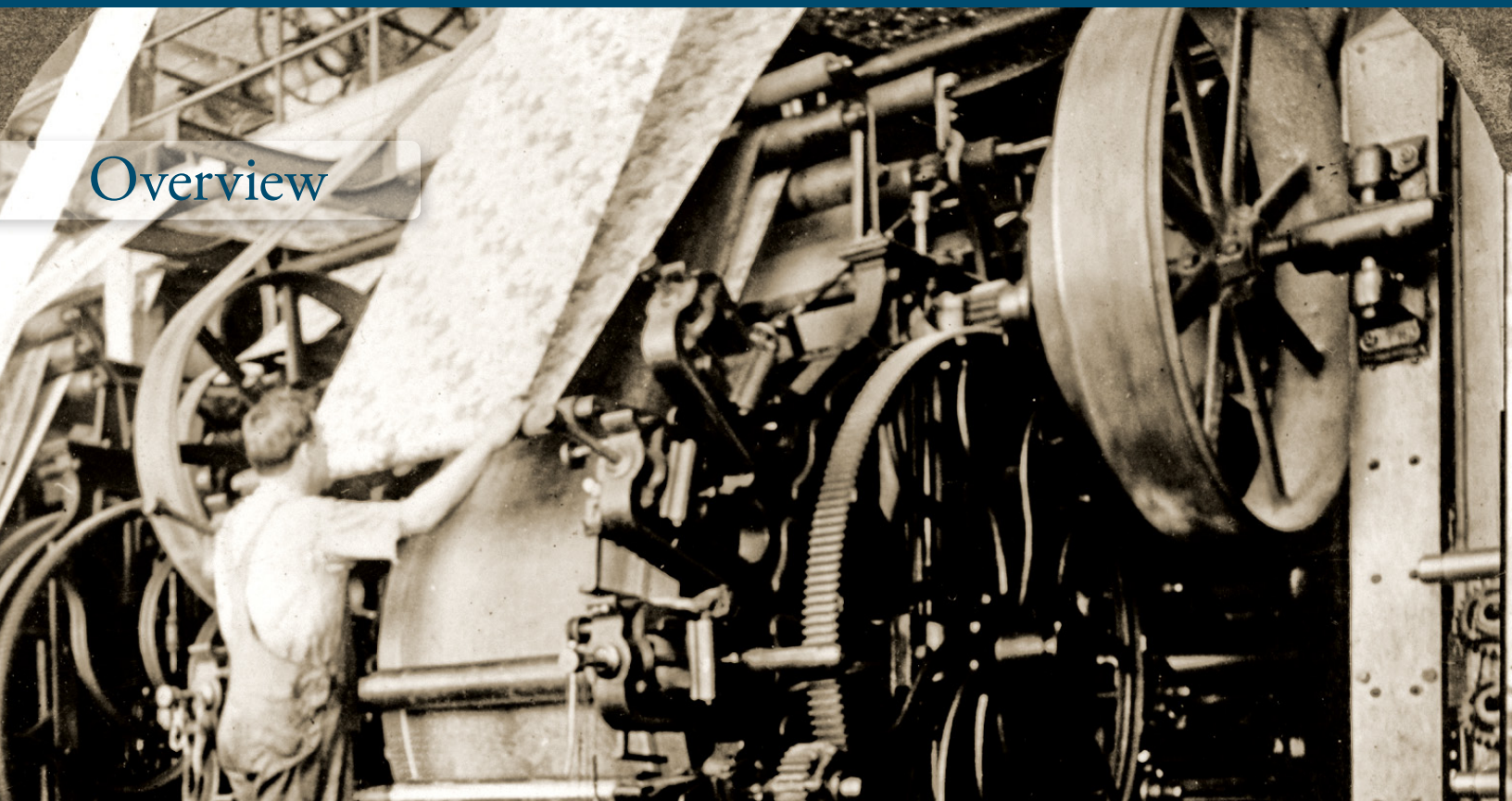
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## Overview



Manufacturing fabric, ca. 1923

The “Roaring Twenties” is commonly portrayed as an era in U.S. history marked by great prosperity, and for most Americans, indeed, it was. Large numbers of people had access to fabulous new inventions, bringing changes in lifestyle that we find familiar and often take for granted in the twenty-first century.

However, with changes come consequences—some intended and foreseeable, others surprising and

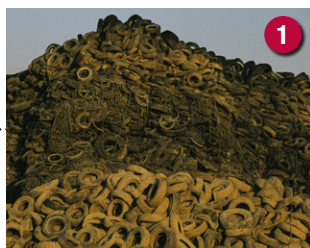
unwelcome. From this laissez-faire era with little government regulation came unbridled growth with both long-term, as well as immediate, effects on people and on the environment in which they lived.

In this unit, students explore this fascinating era to understand the dynamics of economic change and its social, political, and environmental consequences. Students learn about and see the patterns of these changes and consequences through the

ongoing development and use of a graphic organizer displaying the rise of **mass production** and **mass consumption** in the 1920s.

The first lesson uses a reading about the Tracy Tire Fire of 1998–2000 to introduce students to the concept of “unintended consequences.” While there were some concerns expressed, people did not know how to safely dispose of the waste and **byproducts** generated by the automobile and other new

## At a Glance



1

### New Inventions Bring New Challenges

Read about the California Tracy Tire Fire and identify effects of tire production on natural systems.



2

### The Rise of Mass Production

Examine the relationships among inventions, natural resources, and mass production.



3

### A Rise in Mass Consumption

Explore the mass production and consumption cycle. Analyze advertisements and products of the 1920s.





## California Content Standard

**11.5.** Students analyze the major political, social, economic, technological, and cultural developments of the 1920s.

**11.5.7.** Discuss the rise of mass production techniques, the growth of cities, the impact of new technologies (for example, the automobile, electricity), and the resulting prosperity and effect on the American landscape.

technologies developed in the 1920s. Subsequent lessons introduce students to the 1920s as a time of social, political, and economic change influenced by preceding events and available natural resources.

In Lessons 2 and 3, students explore the rise of mass production and consumption. Made possible by scientific and technological developments arising out of the Industrial Revolution and World War I, automobiles, electrical appliances, and other industrial products arrived on the market. Lesson 3 examines how manufacturers marketed these mass-produced technologies to Americans in ways never before seen, including the introduction of credit. Successful marketing fueled demand, driving development of other new technologies and drawing increasingly upon the supply of natural resources.

## California Environmental Principle IV

The exchange of matter between natural systems and human societies affects the long-term functioning of both.

**Concept A:** Students need to know that the effects of human activities on natural systems are directly related to the quantities of resources consumed and to the quantity and characteristics of the resulting byproducts.

**Concept B:** Students need to know that the byproducts of human activity are not readily prevented from entering natural systems and may be beneficial, neutral, or detrimental in their effect.

In Lesson 4, students learn that the development of, demand for, and use of these innovations from the 1920s both directly and indirectly influenced the country's human communities and **natural systems**. From the designation of the first official **landfills** to the effects of oil and coal exploration, students explore ways in which the technological advancements and the prosperity that followed World War I changed

the environment. They also examine the environmental consequences of decisions made—and not made—by industry, government, and individual citizens. The final lesson challenges students to apply what they have learned by evaluating the merits and potential problems associated with plastic grocery bags. Students also consider ways of preventing, as well as remedying, detrimental environmental outcomes.



### Changing the American Landscape

View American landscapes to discover the effects of production and consumption on natural systems.



### Consequences of Consumption

Investigate how plastic bags illustrate the effects of new technologies on natural systems.

# California's Waste Tire Problem

## Part I

In August 1998, more than seven million used tires caught fire in an illegal dump outside of Tracy, California. Dense black smoke plumed to heights of 6,500 feet, carrying with it particulate matter, carbon monoxide, nitrogen oxides, heavy metals, and other toxic substances. The piles had reached as high as 50 feet and spread out over 52 acres among used oil filters, abandoned vehicles, and other refuse.



The fire started when the tire dump's owner was mowing nearby grassland. When sparks from his tractor engine ignited the grassland, flames leaped to the piles of

tires. Emergency response teams decided not to extinguish the fire. They feared that water used to dampen the flames would create hazardous runoff, which could threaten groundwater. The Tracy Tire Fire burned for more than two years before firefighters finally extinguished it in December 2000. It took over five years to remove partially burned tires, debris, and more than 50,000 cubic yards of contaminated waste. Clean-up costs totaled \$18 million.

### An Environmental Disaster

The Tracy Tire Fire was an environmental disaster resulting from the millions of used tires accumulating in California since the 1920s. Tires are not classified as hazardous waste, however, once ignited, they create dense clouds of hazardous pollutants. Because tire fires are so difficult to extinguish, pollutants can be released into the air

for months or years. Because of their hollow shape, about 75 percent of a tire is empty space. This space holds a large oxygen supply and even funnels air drafts throughout tire piles which “fan” a fire. Tire fires burn at very high temperatures, which forces pyrolytic oil, a tar-like substance, out of the rubber. The rubber in a tire contains approximately two gallons of oil, which, if released, can contaminate soil and water. Hazardous waste from a tire fire can also contaminate surrounding areas with arsenic, lead, and numerous other toxic compounds. This toxic waste must be contained so that it does not leach into groundwater or nearby surface water. In many cases, the contaminated soil must be removed and transported to a hazardous waste landfill.

California has more registered vehicles than any other state. A byproduct of this “car culture” is the use of a staggering number of tires. Californians generate 40.8 million used tires annually, some of which could be reused. Another 1.5 million old tires are held in illegal stockpiles where they provide a habitat for rodents and other pests, such as mosquitoes, that breed in rainwater that collects in the used

tires. Tires, unless processed, may not be disposed of in municipal landfills, where they can rise to the top of the waste pile because of their relatively light weight. Whether in landfills or illegal stockpiles, used tires create a fire hazard. Illegal dumping of waste tires is a problem in many parts of the country, and California is no exception.

### A Mounting Problem

People often travel to impoverished areas, such as inner-city alleyways and rural areas, to dump used tires. Some people dump their old tires because they simply do not know about the hazards they create. Others dump the old tires because they do not care, as long as the tires are gone from their backyards. Major environmental disasters like the Tracy Tire Fire, remind us of just how dangerous it is to stockpile used tires.

Californians will consume approximately 200 million tires over the next five years. This means we will have 200 million additional waste tires to manage. As our population grows and more people drive on highways every year, an important question remains, What should we do with all of these old tires?



## Part 2



The California Integrated Waste Management Board (CIWMB) is one of six boards and offices under the umbrella of the California Environmental Protection Agency (Cal/EPA). The CIWMB is responsible for the collection, transportation, processing, recycling, or disposal of waste materials in California. Managing waste tires is one of CIWMB's jobs. This State entity has an active role in reducing landfill waste and stockpiling, in recycling material from used tires, and in protecting public health and the environment.

Each year, CIWMB successfully diverts more than 30 million used tires from stockpiles or landfills. The CIWMB provides money to local governments to recover waste tires from the public. It also pays for the development of public education materials to raise public awareness about the problem of waste tires in California.

Once waste tires are collected, they can be reused, retreaded, or recycled. If tires still have a legal tread depth, they can be reused. Each year about two million used tires are sold and reused. Tires can be retreaded if they are too worn down for reuse. California has more than 50 retread plants, which sell millions of retreaded tires each year.

One of the main ways the CIWMB keeps tire waste out of landfills is by developing markets for recycled tire materials. It funds research projects to find new uses for tire products, as well as provides economic incentives to local governments and businesses to use and manufacture recycled-tire products. One such product is crumb rubber, which can be used for playground turf, speed bumps, carpet tiles, mats, sound barriers, and molded rubber products. Rubberized asphalt can be used to repave roads. It is more durable and smoother than conventional asphalt and helps reduce traffic noise. Tire shreds have been used to build highway retaining

walls as well as dampen the sound in light-rail systems. Tires are also burned for fuel, most of which is used in the cement manufacturing industry. The public can support such new uses of old tires by buying tire-derived products, such as playground equipment, roof shingles, and new tires made from recycled rubber.

The CIWMB also plays a major role in the cleanup and remediation of tire dumps, as well as in the tracking and law enforcement actions needed to prevent such dumps. The CIWMB began remediating old tire piles in 1994, and it has removed over 771,128 tons of illegal waste tires and contaminated trash from 60 sites. Cleanup involves stabilizing tire piles, removing and transporting tires to a facility where they can be recycled, and removing any leftover toxic wastes. The total cost of site remediation has been \$40 million. Most of this money was spent on major tire fires, such as the one in Tracy.

The CIWMB works with local law enforcement and highway patrol agencies to stop illegal tire dumping, which is concentrated in U.S. border regions. Some of the tools they use to monitor illegal tire dumping include satellite technology and motion-activated surveillance. The Waste and Used Tire Hauler and Manifest Program requires waste haulers to register and record each

tire transaction. This tracking system helps to monitor the flow of waste in the state.

When Cal/EPA, local governments, law enforcement agencies, private businesses, and an educated public work together, tires can be reused, retreaded, or recycled to make many useful products. Used tires are not just a waste product to be discarded. Instead, when handled properly, they can become a valuable resource.

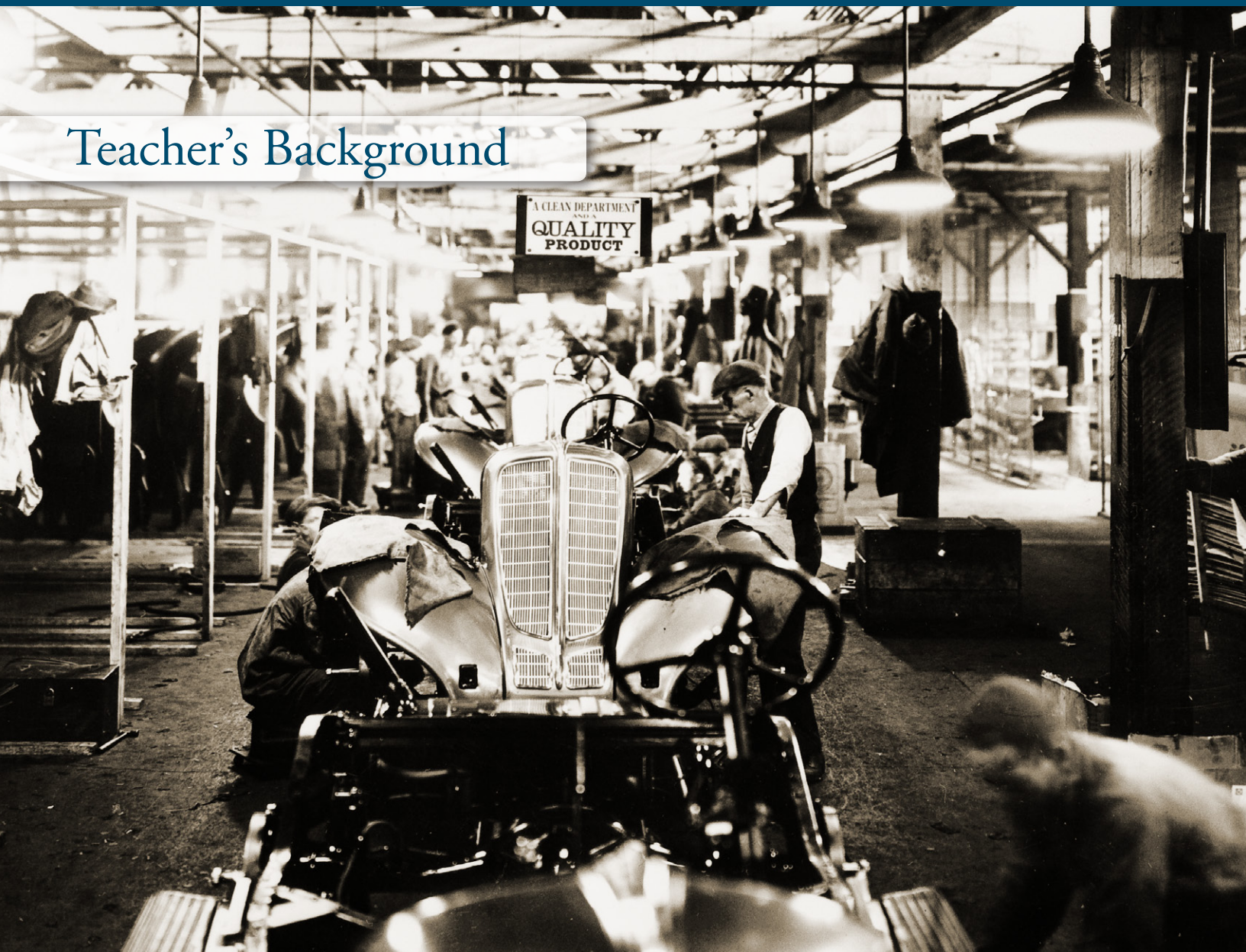
*Note: As of January 1, 2010, the California Integrated Waste Management Board became the Department of Resources Recovery and Recycling, under the California Natural Resources Agency.*



Burning tires



## Teacher's Background



Automobile assembly line, ca. 1928

Economic developments and associated political, social, and environmental changes frequently follow particular patterns. New technology provides a basis for the development of new consumer goods; the production of which draws on natural resources and **ecosystem goods** extracted from nature.

Marketing and other practices stimulate increased consumer demand for those products, which in turn pushes investment to fuel further production. That increased production creates a “pull” for further technological development and expanded **extraction** of natural resources. During production and subsequent consumption, manufactured products

produce waste byproducts, many of which can have detrimental effects on natural systems. The ensuing changes in lifestyle, as well as the environmental and political consequences, may further advance this process or, at times, slow its pace.

The 1920s represent a remarkably vivid expression of these dynamics. Both the speed and the scale of



Clothing assembly line, ca. 1915



these processes were markedly greater during that period than had ever occurred previously in U.S. history. The terms “mass production” and “mass consumption” clearly describe the practices that accelerated during the Roaring Twenties. A confluence of circumstances helps explain why these changes happened during that particular decade.

## Wartime Innovations

During World War I, new scientific ideas led to new technologies as part of the military effort, particularly in support of U.S. allies. Techniques of mass industrial production had been in use since the Civil War, but the scale of this global war created tremendous pressures to replace outmoded technologies with new ones that could sustain large-scale fighting on the battlefield. Some new mass-produced items, such as poison gases, submarines, tanks, small arms, and flamethrowers, were designed exclusively to wage war, but others, such as airplanes, radios, and canned food, could be used directly by civilians or adapted for civilian purposes. By the end of World War I, the United States was producing items like automobiles and trucks at a rate far higher than before. It also had a new infrastructure built on innovative modifications to older systems, like the assembly line, to support mass production of other items that would revolutionize U.S. society.

The list of goods produced and consumed in mass quantities for the first time during the 1920s is extensive. From the automobile to processed foods to appliances powered by electricity—which itself spread to areas of use previously unimagined—Americans began to change the ways they conducted their daily activities. First in the cities and eventually in the farthest reaches of the countryside, people came to own and use these

new products. Radios, refrigerators, gas and electric ranges, and vacuum cleaners either replaced existing tools or took their place in the pantheon of common household appliances.

## Creative Marketing

What generated the demand for these new products? Certainly, much of it derived from the usefulness of the products themselves. Automobiles provided mobility; radios expanded communication; appliances assisted workloads. At the same time, both industries and individual entrepreneurs worked hard to generate increasing demand on the part of consumers. Marketing campaigns sought to convince hardworking Americans that they needed and deserved the many new products being mass-produced. National advertising of branded goods grew with the rise of department stores, expansion of mail-order catalogues, and the increase in mass-circulation magazines. The advertisements promoted goods to engage Americans in leisure-time activities, such as movies and sports, and they encouraged the celebration of prosperity through the acquisition of material goods.

New marketing approaches proved extremely successful in inculcating a sense of “need” on the part of potential buyers, using advertising and other means to create a new ethos around the connection between consumption and personal identity. Systems to stimulate investment and to provide consumers with opportunities to use credit to purchase items for which they did not have actual money on hand also played a huge role in pushing mass consumption of mass-produced goods.

## Mass Production

Mass production requires extraction of natural resources for both raw materials and production power. Oil, gas, and water derived from natural systems provided sources of energy to fuel factory production of products, as well as the in-home use of many new appliances. Trees provided lumber, resins, and cellulose needed for products and for building. Waterways supplied power and transportation for raw materials and processed goods. Minerals were being used to surface roads and to manufacture building and industrial products.



Canning factory, 1909



Gas station, 1921

All of these natural resources fueled a system set up to satisfy consumers' "needs" for new products. The effects on the environment were extensive, as people increasingly extracted and consumed nonrenewable resources, sought new supplies, land, built roads, and fostered the growth of cities.

The "positive feedback loop" of demand-production-consumption (consumption of both the products and the natural resources needed to make them) characterized the 1920s. Heightened demand stimulated investment in new technologies and increased production, which in turn led to greater consumption and increasing demand for associated products. With increasing numbers of cars came the need for more and better roads; as people traveled more, they needed motels in which to sleep. As people bought more refrigerators and other appliances, additional electrical lines had to be run and more towers built. This required increasing draws on natural resources to provide the steel, paint, textiles, rubber, and electricity

needed for production, and the oil for gasoline to keep cars running. Marketing drove consumption, as consumers developed a need for bigger cars and more home appliances, and manufacturers extracted the resources to keep up with demand.

### Love Canal

The building of Love Canal in the 1890s exemplifies how the exchange between natural systems and human societies can affect the long-term functioning of both. Entrepreneur William T. Love intended to build a canal connecting the two levels of the Niagara River separated by Niagara Falls. He believed he could produce hydroelectricity to serve the region's growing industries; however, he never completed his plan due to complications.

After 1892, Love decided to instead develop a shipping lane to bypass Niagara Falls. He envisioned an ideal urban area called "Model City" and planned to build a community of parks and homes just off the canal. Soon after he started digging the

canal and building streets and homes, he ran out of money and abandoned the project.

In the late 1920s, the canal became a municipal and industrial dump site. In the 1940s, the Hooker Chemical Company purchased the Love Canal as a dump site for its chemical waste. The company had prospered in the production of plastics to satisfy American consumers' appetites for goods, but the production process generated millions of tons of **toxic waste**. The company lined the canal with clay, placed metal barrels of waste in the site, and covered them with dirt. Several years later, the people in the community that grew up around the Love Canal began to grapple with life-threatening illnesses. The toxic waste, once secured in the barrels, had seeped into the soil and into the region's groundwater. By the 1950s, the American landscape had indeed begun to change in the form of environmental degradation due to mass production and mass consumption of goods in the 1920s.





## A Changing Landscape

By and large, the process of economic expansion and its associated effects went on unabated. The effects on lifestyle were dramatic. Cities grew as industry developed. Los Angeles, for example, more than doubled in size from less than 600,000 to more than 1.2 million people between 1920 and 1930. With the possibility of commuting into cities, people moved to the suburbs, which expanded at more than double the rate of the cities themselves. The nature of work itself, both for assembly-line workers and for those who managed them, also changed. Even people's relationship with food changed. With new technologies to process and package foods, agrarian "zones" developed in which farmers specialized in "commodity" food production, and grocery stores sold food far from where it was grown.

The effects on the environment were equally far-reaching. Besides the consequences of resource extraction, the waste byproducts created by both production and consumption of new products changed the landscape. Municipal landfills—the standard system for disposing of the new byproducts—became a controversial new feature of the American landscape in the 1920s. Pollution of soil, air, waterways, and marine environments skyrocketed. Many toxic pollutants, such as the benzene found in gasoline, had negative effects on health.

In a laissez-faire era, the federal government did little to help regulate or mitigate practices that created systemic problems, and the laws that existed were often ignored or circumvented. The effects of pollution and waste continued into the late twentieth century and, in many cases, continue today. Yet, government can play a role both in remedying problems created in the past and in

preventing those that may lie in the future. Government may choose to regulate certain industries to protect the public interest, create programs to mitigate existing problems, or develop **incentives** for industry to invest in new technologies that do not degrade the environment. Citizens, acting as

individual members of society and in cooperating groups, also have important roles to play. They are important actors in the fight to support responsible environmental policies and practices.



Truck delivering beef, 1923

## Glossary

**Byproduct:** Something, such as waste materials or chemicals, produced when something else is manufactured or consumed.

**Ecosystem goods:** Tangible materials, such as timber and food, produced by natural systems, that are essential to human life, economies, and cultures.

**Extraction:** The collection or removal of a natural resource or the separation of a metal from ore.

**Incentive:** A policy, action, or reward that motivates or inspires a person or entity to take a certain action.

**Landfill:** A solid waste disposal site where garbage is buried between layers of dirt.

**Mass consumption:** The act or process of consuming a large quantity of a product or resource.

**Mass production:** The act or process of producing a large quantity of goods.

**Natural system:** The interacting components, processes, and cycles within an environment, as well as the interactions among organisms and their environment.

**Toxic waste:** Waste materials and chemicals that are poisonous and harmful to humans and other organisms.

# Unit Planner

	Lesson	Learning Objectives	Summary of Activities
1	<b>New Inventions Bring New Challenges</b>  <b>Preparation Time:</b> 15 min. <b>Instructional Time:</b> 50 min.	<ul style="list-style-type: none"> <li>■ Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials).</li> </ul>	<p>Students read about and view photographs of the Tracy Tire Fire in <b>California Connections: California's Waste Tire Problem</b>. They identify natural resources used to make tires and discuss direct and indirect effects of tire production and consumption on natural systems.</p>
2	<b>The Rise of Mass Production</b>  <b>Preparation Time:</b> 15 min. <b>Instructional Time:</b> 50 min.	<ul style="list-style-type: none"> <li>■ Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems.</li> </ul>	<p>Students learn about inventions, mass production, and mass consumption, and then summarize basic ideas in a graphic organizer. Using cars as an example, they begin a chart that analyzes the intended and unintended consequences and environmental effects of mass-produced consumer goods.</p>
3	<b>A Rise in Mass Consumption</b>  <b>Preparation Time:</b> 10 min. <b>Instructional Time:</b> 50 min.	<ul style="list-style-type: none"> <li>■ Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems.</li> <li>■ Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials).</li> </ul>	<p>Students use a chart to explore the rise of mass production and mass consumption. In small groups, they discuss and analyze ads from the 1920s and compile information about several products. They then write about the influence of marketing on consumer decisions.</p>





Prerequisite Knowledge	All Materials Needed	Textbook Alignment
<p><b>Students should know:</b></p> <ul style="list-style-type: none"> <li>■ how scientific and technological changes and new forms of energy brought about massive social, economic, and cultural change.</li> </ul> <p><b>Students should be able to:</b></p> <ul style="list-style-type: none"> <li>■ summarize information in writing.</li> </ul>	<p><b>A-V Equipment:</b></p> <ul style="list-style-type: none"> <li>■ projection system, screen</li> </ul> <p><b>Class Supplies:</b></p> <ul style="list-style-type: none"> <li>■ chart paper</li> <li>■ colored markers</li> <li>■ pencils or pens</li> <li>■ tape or thumbtacks</li> <li>■ writing paper</li> </ul> <p><b>Provided Separately:</b></p> <p><b>Information Cards:</b></p> <ul style="list-style-type: none"> <li>■ Alarm Clock Advertisement</li> <li>■ Camera Advertisement</li> <li>■ Canned Food Advertisement</li> <li>■ Lightbulb Advertisement</li> <li>■ Telephone Advertisement</li> </ul> <p><b>Student Edition</b></p> <p><b>Student Workbook</b></p> <p><b>Teacher's Masters</b></p> <p><b>Visual Aids</b></p> <p><b>Wall Maps:</b></p> <ul style="list-style-type: none"> <li>■ Political</li> </ul> <p><i>Lesson Toolboxes identify lesson-specific needs.</i></p>	<p><b>AMSCO:</b> United States History Pages 473–479</p> <p><b>Glencoe:</b> American Odyssey, the United States in the 20<sup>th</sup> Century (2004) Pages 359, 361, 368, 372–373, 380, 385</p> <p>The American Republic Since 1877 (2005) SE Pages 516, 518–520, 524</p> <p>The American Vision (2005) SE Pages 625, 641–642, TE Pages 641, 644</p> <p>The American Vision Modern Times (2006) SE Pages 450–455, 460–461, 463</p> <p><b>Holt:</b> American Nation in the Modern Era (2005) Pages 414–421, 438–439</p> <p><b>McDougal Littell:</b> The American Pageant, Twelfth Edition PE Pages 739–748, 751–752, GGB Pages 315–323</p> <p>The Enduring Vision, Fourth Edition PE Pages 680–683, 688–690, SG Pages v2 90–92</p> <p>The Americans: Reconstruction to the 21<sup>st</sup> Century (2003) Pages 421–427, 430–431</p>
<p><b>Students should know about:</b></p> <ul style="list-style-type: none"> <li>■ the transformation of the U.S. economy and the changing social and political conditions in the United States in response to the Industrial Revolution.</li> </ul> <p><b>Students should be able to:</b></p> <ul style="list-style-type: none"> <li>■ analyze cause and effect.</li> <li>■ take notes on a lecture.</li> </ul>		
<p><b>Students should know about:</b></p> <ul style="list-style-type: none"> <li>■ the transformation of the U.S. economy and the changing social and political conditions in the United States in response to the Industrial Revolution.</li> <li>■ the significant inventors and their inventions from the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, and how they improved the quality of life.</li> </ul> <p><b>Students should be able to:</b></p> <ul style="list-style-type: none"> <li>■ draw upon prior knowledge and experience to analyze goods for their intended and unintended uses as well as materials used to develop the product.</li> <li>■ analyze advertisements for information and interpretation.</li> </ul>		

	Lesson	Learning Objectives	Summary of Activities
4	<b>Changing the American Landscape</b>  <b>Preparation Time:</b> 15 min. <b>Instructional Time:</b> 50 min.	<ul style="list-style-type: none"> <li>■ Describe the direct and indirect influences of growing cities on the American landscape and the associated natural systems.</li> </ul>	<p>Students analyze and discuss scenes depicting American landscapes in the 1920s, learn about lifestyle changes based on mass production and consumption, and complete a graphic organizer about the relationships between the cycle of production and consumption and natural systems.</p>
5	<b>Consequences of Consumption</b>  <b>Preparation Time:</b> 10 min. <b>Instructional Time:</b> 50 min.	<ul style="list-style-type: none"> <li>■ Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems.</li> <li>■ Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials).</li> </ul>	<p>Students review <b>California Connections: California's Waste Tire Problem</b> and brainstorm mass-produced goods in use today. After completing a chart, describing the cycle of mass production and consumption to plastic bags, they discuss and write about the effects of plastic bags on natural systems.</p>



Prerequisite Knowledge	All Materials Needed	Textbook Alignment
<p><b>Students should know about:</b></p> <ul style="list-style-type: none"> <li>■ patterns of agricultural and industrial development as they relate to climate, use of natural resources, markets, and trade.</li> <li>■ the location and effects of urbanization, renewed immigration, and industrialization.</li> </ul> <p><b>Students should be able to:</b></p> <ul style="list-style-type: none"> <li>■ identify natural systems.</li> <li>■ take notes on a lecture.</li> </ul>		<p><b>Prentice Hall:</b> America Past and Present (2002) Pages 735–740</p> <p>America Pathways to the Present, Modern American History (2005) Pages 496–499, 501–506</p> <p>America Pathways to the Present, Modern American History (2007) Pages 491–499, 501–502, 504–505</p> <p><i>Based on sample textbooks available at the time of production.</i></p>
<p><b>Students should know about:</b></p> <ul style="list-style-type: none"> <li>■ transformations of the U.S. economy and the changing social and political conditions in the United States in response to the Industrial Revolution.</li> <li>■ the connections among natural resources, entrepreneurship, labor, and capital in an industrial economy.</li> </ul> <p><b>Students should be able to:</b></p> <ul style="list-style-type: none"> <li>■ interpret charts and graphic organizers.</li> <li>■ take notes on a lecture.</li> <li>■ summarize ideas in writing.</li> </ul>		

# English Language Development

Lessons in the EEI Curriculum are designed to support students' English language development. The strategies in these lessons are based on some of the practices identified in the Reading/Language Arts Framework for California Public Schools (California Department of Education 2007). Student ELD levels (CELDT) should be identified. Use of the strategies identified as effective for the students' level should be applied when building the history-social science concepts.

## To establish successful instructional strategies for all students, the teacher should:

- **Use a wide variety of ways to explain a concept or assignment.** When appropriate, the concept or assignment may be depicted in graphic or pictorial form, with manipulatives, or with real objects to accompany oral and written instructions.
- **Provide assistance in the specific and general vocabulary prior to each lesson,** using reinforcement and additional practice afterward. Instructional resources and instruction should be monitored for ambiguities and language that could be confusing to students, such as idioms.
- **Ask each student frequently to communicate** his or her understanding of the concept or assignment. Students should be asked to verbalize or write down what they know, thereby providing immediate insight into their thinking and level of understanding. In addition, students should be encouraged to confer about each other's understanding of the concept being taught and the classwork or homework assignments, particularly if the students are not fully proficient in English.
- **Check frequently for understanding in a variety of ways.** When a student does not understand, analyze why.
- **Allow students to demonstrate their understanding and abilities** in a variety of ways while reinforcing modes of communication that are used on standardized tests.
- **Use pacing to differentiate instruction according to students' needs.** Reinforce the more difficult concepts for students experiencing difficulty in the language arts by providing additional time and using the visual aids provided. Accelerate the instructional pace for advanced learners if the assessments indicate mastery of the standard.





**The California EEI Curriculum includes a variety of research-based English language development practices, such as:**

## Vocabulary Development

- Teach difficult vocabulary prior to and during the lesson
- Provide reading, speaking, and assessment tasks that reinforce new vocabulary

## Reading Comprehension

- Use grade-level readers, articles, and reading assignments to build comprehension in the content area
- Engage students in meaningful interactions about text
- Provide activities that assess student comprehension and build decoding skills

## Writing Strategies and Applications

- Provide opportunities for students to organize ideas and information in a written form including concept maps

- Use stories, articles, and other written materials to model good writing
- Provide assessment tasks that allow students to apply their grade-level writing skills

## Listening and Speaking Strategies and Applications

- Ask questions to ensure comprehension
- Elicit responses from all students, encourage students to give elaborate responses, and give students time to respond to questions
- Incorporate students' responses, ideas, examples, and experiences into the lesson
- Model and teach language patterns needed to understand and participate in the study of the content areas
- Encourage a high level of response accuracy
- Use visual aids, manipulatives, and real objects to support content delivery

The language arts skills that have checkmarks are used by students as they participate in the lessons.

	 Vocabulary	 Reading	 Writing	 Listening	 Speaking
Lesson 1	✓	✓	✓	✓	✓
Lesson 2	✓	✓	✓	✓	✓
Lesson 3	✓	✓	✓	✓	✓
Lesson 4	✓	✓	✓	✓	✓
Lesson 5	✓	✓	✓	✓	✓

# Differentiated Instruction

**T**he 2007 Reading/Language Arts Framework for California Public Schools (California Department of Education 2007) provides guidance for helping students with diverse abilities succeed with California's English–Language Arts Content Standards. The instructional units developed for California's Education and the Environment Initiative provide ample opportunities for teachers to differentiate instruction to meet these needs.

It is important to take into account the State Board of Education's and Department of Education's guidance on differentiated instruction while implementing this instructional unit. Page 263 of the 2007 Framework summarizes this guidance as follows:

*The diversity of California's students presents unique opportunities and significant challenges for instruction. Students come to school with a wide variety of skills, abilities, and interests as well as varying proficiency in English and other languages. The wider the variation of the student population in each classroom, the more complex becomes the teacher's role in organizing high-quality curriculum and instruction in the language arts and ensuring that each student has access according to the student's current level of achievement. The ultimate goal of language arts programs in California*

*is to ensure access to high-quality curriculum and instruction for all students in order to meet or exceed the state's English–language arts content standards. To reach that goal, teachers need assistance in assessing and using the results of that assessment for planning programs, differentiating curriculum and instruction, using grouping strategies effectively, and implementing other strategies for meeting the needs of students with reading difficulties, students with disabilities, advanced learners, English learners, and students with combinations of special instructional needs.*

## **Procedures that may be useful in planning for universal access are to:**

- Assess each student's understanding at the start of instruction and continue to do so frequently as instruction advances, using the results of assessment for program placement and planning.
- Diagnose the nature and severity of the student's difficulty and modify curriculum and instruction accordingly when students have trouble with the language arts.
- Engage in careful organization of resources and instruction and planning to adapt to individual needs. A variety of good teaching strategies that can be used according to the situation should be prepared.
- Differentiate when necessary as to depth, complexity, novelty, or pacing and focus on the language arts standards and the key concepts within the standards that students must master to move on to the next grade level.
- Employ flexible grouping strategies according to the students' needs and achievement and the instructional tasks presented.
- Enlist help from others, such as reading specialists, special education specialists, parents, aides, other teachers, community members, administrators, counselors, and diagnosticians when necessary and explore technology or other instructional devices or instructional materials, such as braille text, as a way to respond to students' individual needs.

Additional information about best practices in differentiated instruction is detailed in Chapter 7 of the Framework.



## Traditional Unit Assessment

### Description

This traditional unit assessment is designed to parallel the structure and format of tests used in California's adopted instructional materials and statewide assessments.

**Mass Production, Marketing, and Consumption** (Traditional Unit Assessment Master) is comprised of multiple choice and short answer questions that assess students' achievement of the unit's learning objectives. Successful completion of this test demonstrates their proficiency with History-Social Science standard 11.5.7: "Discuss the rise of mass production techniques, the growth of cities, the impact of new technologies (for example, the automobile, electricity), and the resulting prosperity and effect on the American landscape."

Distribute a copy of **Mass Production, Marketing, and Consumption** to each student. Collect completed tests.

### Advanced Preparation

Gather and prepare Traditional Unit Assessment Masters:

- **Mass Production, Marketing, and Consumption**  
Teacher's Masters, pages 2–6  
One per student

### Suggested Scoring

An Answer Key and Sample Answers for **Mass Production, Marketing, and Consumption** are provided on pages 20–24. There are 50 total points possible.

### Preparation Time

10 min.

### Assessment Time

50 min.



## Answer Key and Sample Answers

### Mass Production, Marketing, and Consumption

Traditional Unit Assessment Master | page 1 of 5

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Name: \_\_\_\_\_

#### Part 1

**Instructions:** Select the best answer and circle the correct letter. (2 points each)

- Which of the following was not a result of mass production techniques in the 1920s?
  - extraction of natural resources
  - development of the assembly line
  - consumption of manufactured goods
  - ☒ increased costs of automobiles
- Which of the following was a pattern that repeated during the 1920s?
  - products consumed; products produced; demand for more products
  - ☒ products produced; products consumed; demand for more products
  - byproducts and waste; demand for more products; products consumed
  - demand for more products; products consumed; investments made
- A beneficial byproduct made from coal tar is \_\_\_\_\_.
  - automobiles
  - gasoline
  - ☒ plastics
  - telephones
- In the 1920s, the rate of consumption decreased for which of the following manufactured goods?
  - cameras
  - lightbulbs
  - vacuum cleaners
  - ☒ weapons
- The development of plastic shopping bags is an example of \_\_\_\_\_.
  - mass consumption
  - mass production
  - ☒ new technology
  - marketing
- Which of the following resulted from the mass production and consumption of the 1920s?
  - litter in the ocean
  - ☒ large-scale landfills
  - polyethylene
  - city recycling systems

## Answer Key and Sample Answers

### Mass Production, Marketing, and Consumption

Traditional Unit Assessment Master | page 2 of 5

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Name: \_\_\_\_\_

7. Which of the following is remediation due to the detrimental effect of mass production and consumption on natural systems?
  - a. white pollution
  - b. North Pacific currents
  - ☒ c. plastic bag bans
  - d. sanitary landfills
8. In the 1920s, affordable cars and new roads had a direct influence on the American landscape through \_\_\_\_\_.
  - a. 40-hour workweeks
  - ☒ b. the expansion of suburbs
  - c. the purchase of home appliances
  - d. the use of assembly lines
9. Which of the following statements best describes an indirect influence of growing cities on the American landscape and its natural systems?
  - ☒ a. Landfills were made to dispose of the increased waste from consumption.
  - b. A prosperous decade provided stable jobs, letting many people increase their leisure time.
  - c. Mass production led to increased uses of natural resources, such as oil and steel.
  - d. Electricity replaced coal and water as fuel for manufacturing.
10. Building roads, restaurants, and filling stations were a result of which innovation used in the 1920s?
  - ☒ a. assembly line
  - b. marketing
  - c. landfills
  - d. steam engines
11. Which of the following is an example of direct effects of new technologies on natural systems?
  - a. building highways for cars
  - b. animals ingesting plastics
  - ☒ c. habitat damage resulting from drilling for oil
  - d. sanitary landfills for plastic bags
12. Which of the following is an example of indirect effects of new technologies on natural systems?
  - a. conversion of steam to electricity
  - b. electrical lighting in homes
  - c. mining iron ore to make cars
  - ☒ d. roadside filling stations



## Answer Key and Sample Answers

### Mass Production, Marketing, and Consumption

Traditional Unit Assessment Master | page 3 of 5

Name: \_\_\_\_\_

13. Which of the following statements best describes the effects of many new home appliances introduced in the 1920s on natural systems?
- a. Women found more leisure time due to modern conveniences.
  - b. Time-saving appliances, such as the washer, decreased water pollution.
  - ☒ c. More homes needed energy and were wired for electricity.
  - d. Renewable natural resources provided raw materials for production.
14. What stimulated the demand for more mass-produced goods?
- a. byproducts
  - b. investments
  - ☒ c. marketing
  - d. waste
15. Which turn-of-the-century invention led to unintended consequences in dump sites like the one in Tracy, California?
- ☒ a. automobile
  - b. hair dryers
  - c. plastics
  - d. telephones

### Part 2

**Instructions:** Read and answer the following questions. (4 points each)

16. What caused the rise of mass production and mass consumption in the 1920s?

*In the 1920s, after WW I, factories that had mass-produced weapons and military goods began making consumer products. Technologies for mass production improved. For example, Henry Ford improved the assembly line to make cars more quickly and less expensively. Transportation systems also improved. This made natural resources more available to factories and allowed mass-produced goods to be transported to markets around the world. More consumer products available at lower costs and good marketing of these products led to mass consumption.*

## Answer Key and Sample Answers

### Mass Production, Marketing, and Consumption

Traditional Unit Assessment Master | page 4 of 5

Name: \_\_\_\_\_

17. What was the relationship between mass production, natural resources, consumption, and byproducts in the 1920s?

*In the 1920s, more and more consumer items were mass-produced to meet the mass consumption needs of the American public. Producing these items required natural resources, such as coal, oil, water, rubber, gas, etc. Manufacturing more consumer goods meant that more natural resources were needed. The manufacturing process also produced byproducts, or excess materials. In addition, byproducts were generated when some products, such as lightbulbs, were discarded after use. The disposal of byproducts from mass production and mass consumption affected the natural systems that provided natural resources.*

18. What is an example of a direct effect of new technologies on natural systems?

*Habitat damage resulting from drilling for, pumping, and transporting oil to make new products, such as cars, jet engines, and electric shavers, is an example of a direct effect of new technologies on natural systems.*

## Answer Key and Sample Answers

### Mass Production, Marketing, and Consumption

Traditional Unit Assessment Master | page 5 of 5

Name: \_\_\_\_\_

19. What is an example of an indirect effect of new technologies on natural systems?

*Paving roads, building gas stations, and opening roadside restaurants between cities are examples of indirect effects of a new technology—the automobile—on natural systems.*

*Roads and buildings consumed land and altered natural systems on the plains and in the forests. Gas stations and restaurants added waste and pollution to their environments.*

20. How did growing cities in the 1920s influence the American landscape and the associated natural systems?

*As cities grew in the 1920s, larger transportation systems were created within and between cities. This led to more paved roads, more gas stations, the building of motels and restaurants between cities, and more effects on natural systems. In the cities, more jobs were available and people had more spending money to use for leisure activities and goods. The byproducts of these activities and goods led to the development of landfills, which had a large effect on natural systems.*





## Alternative Unit Assessment

### Description

The assessment strategy described below offers students an alternative way to demonstrate their achievement of the unit's learning objectives and mastery of the standard. There are many other alternative assessment strategies that teachers may choose to develop for use with this unit. Additionally, some students may require assessment strategies that are adapted to their individual needs.

**Public Service Announcement** (Alternative Unit Assessment Master) has students select a technology or product from this unit and create a public service announcement (PSA). This PSA demonstrates their proficiency with History-Social Science standard 11.5.7: "Discuss the rise of mass production techniques, the growth of cities, the impact of new technologies (for example, the automobile, electricity), and the resulting prosperity and effect on the American landscape."

### Advanced Preparation

**Gather and prepare Alternative Unit Assessment Masters:**

- **Public Service Announcement**  
Teacher's Masters, pages 7–8  
One per student

**Gather and prepare Materials Needed.**

### Materials Needed

**Class Supplies:**

- chart paper
- colored markers
- pencils or pens
- writing paper

### Suggested Scoring

An Answer Key and Sample Answers for the **Public Service Announcement** are provided on pages 27–28. There are 25 total points possible.

### Preparation Time

10 min.

### Assessment Time

50 minutes of in-class time, with additional out-of-class time as assigned by teacher.

### Safety Notes

None

# Procedures

## Step 1

Ask students to describe a public service announcement, a “PSA.” Write their responses on the board. (*Noncommercial advertisement found on radio, television, or Internet; related to public good; intended to inform or influence public attitudes about specific issues; intended to raise awareness about issues.*)

Ask students to share examples of public service announcements they have seen. (*Increase literacy; mentor children; eat right and exercise to avoid heart disease; smoking is harmful to people’s health; clean up the beach; carpool*)

## Step 2

Brainstorm with students issues raised during this instructional unit. List these issues on the board. (*Postwar economy shifted from mass production of military goods to mass production of commercial or household goods; available natural resources made mass production possible; inventions and innovations inspired mass production; marketing and credit promoted mass consumption; mass consumption encouraged investors to support more mass production; mass production creates byproducts; mass production utilizes natural resources; direct consequences of mass production and consumption includes extraction of natural resources; indirect consequences of mass production and consumption includes buildings, roads, dumps/ landfills, pollution.*)

Brainstorm with students some technologies and products from the 1920s or today that caused or cause effects that a PSA might address. Write students’ ideas on the board. (*Canned food; hair dryers; plastic telephones; non-rechargeable batteries; plastic water bottles; polystyrene containers; fast food; direct mail catalogues; incandescent lightbulbs*)

## Step 3

Distribute a copy of **Public Service Announcement** (Alternative Unit Assessment Master) to each student. Review the instructions with students.

Explain that students may work independently or in pairs during the 20-minute preparation period, but they must write their own PSAs. Remind students to refer to the board for descriptions of a PSA to ensure that they plan, practice, and present issue-related advertisements intended to inform and influence public attitudes.

## Step 4

At the end of the 20 minutes, have students return to their seats to write their PSAs. Make materials available if students wish to make visuals to accompany their PSAs. Assign students the writing of the script for homework. Assign a due date for the PSAs and have students write this date on their copies of **Public Service Announcement**.

## Step 5

On the due date, collect the **Public Service Announcements** for use in assessment. If time allows, invite some students to present their PSAs to the class.

## Answer Key and Sample Answers

### Public Service Announcement

Alternative Unit Assessment Master | page 1 of 2

Name: \_\_\_\_\_

**Instructions:** Select an innovation or product discussed in this unit or from the present and create a public service announcement (PSA) set in either the 1920s or today.

Your PSA should be a script that could be delivered via radio (1920s) or television (today). Introduce the PSA by stating the year and the innovation or product you have selected. The PSA should not last more than 60 seconds and should include: (up to 5 points for each of the following)

- background information about the technology or product
- a description of how this innovation or product relates to natural resources or natural systems
- an explanation of the direct and/or indirect effects of this innovation/product on natural systems
- information about how production and consumption of this innovation/product generates byproducts and changes the American landscape
- suggestions for the public about the wise use/consumption of this technology/product

Your PSA is due on: \_\_\_\_\_.

### Script for Public Service Announcement

**Year:** 1925

**Product:** Automobile

*A brand new, shiny, black Model T purrs down the street. Each pattering sound reminds you of the ads that claim that every American deserves one of these cars. You wonder, "Will life really be better, easier, and more glamorous with one of these vehicles in front of my home?"*

*Don't buy into the excitement about cars. Cars consume our natural resources and threaten our environment. Producing a car requires metals for the car frame, rubber for the tires, cotton for seat covers, oil and natural gas to power the car factories, and oil to run the car itself. Obtaining these resources directly changes our natural systems. Byproducts indirectly affect our environment through pollution. Soon we will have tar roads suffocating the land from New York to California! What will become of our beautiful fields, plains, prairies, and canyons? How will we dispose of old cars?*



## Answer Key and Sample Answers

## Public Service Announcement

Alternative Unit Assessment Master | page 2 of 2

Name: \_\_\_\_\_

*Ads may tell you that every American deserves a car, but how will that affect our country? Get together with your neighbors and purchase a community car. Share the driving. Use your car to get to important places at important times. Otherwise, keep walking. Protect our beautiful America.*

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.





## Extensions & Unit Resources



### Extension Ideas

Have students develop a multimedia presentation (PowerPoint-based, short film, website) in which they take a current consumer item, identify the costs and benefits of producing and consuming this item (immediate, short- and long-term effects), and suggest approaches to be taken by individuals, groups, and governments to remedy problems and prevent foreseeable future environmental costs. Students must incorporate historical perspectives by referencing at least one example from the 1920s of economic or technological costs and benefits or environmental effects.

Have students research additional consumer goods introduced in the 1920s and create parallel timelines identifying goods that were beneficial to the environment and goods that were detrimental to the environment. Have students present these timelines, and then post them to compare and contrast through viewing and discussion.

Have students select one appliance or consumer good introduced in the 1920s and research the natural resources required for this product. Then, have students map the possible sources of these materials on a world map and present the information to the class. Lead a class discussion about the locations of the natural resources used to mass-produce the chosen product in the United States.

### Resources for Students

California Department of Resources Recycling and Recovery. “Tire Fires.”

<http://www.calrecycle.ca.gov/Tires/Fires/>

California Environmental Protection Agency. <http://www.calepa.ca.gov/>

Greenfeet. “Quick Facts on Plastic Pollution” and “A Sea of Plastic.”

<http://www.greenfeet.net/newsletter/nl200407.shtml>

PBS NewsHour. “Plastic Pollution in the Ocean.”

[http://www.pbs.org/newshour/forum/science/july-dec08/plastic\\_11-13.html](http://www.pbs.org/newshour/forum/science/july-dec08/plastic_11-13.html)

People History. “1920s History.” <http://www.thepeoplehistory.com/1920s.html>

Stanley, Mark, and Jessie Corson. “American Inventions of the 1920s.” RSU 54/MSAD 54.

<http://www.msad54.org/sahs/socialstudies/finely/1920s/1920gr3/Inventions.html>

Surfrider Foundation. <http://www.surfrider.org/>

*Wild Chronicles*. DVD. Segment: 234c “Chad Pregracke, Potomac Clean-Up.” National Geographic Video.





## References for Teachers

Beck, Eckardt C. "The Love Canal Tragedy." Environmental Protection Agency.

<http://www.epa.gov/history/topics/lovecanal/01.htm>

California Department of Resources Recycling and Recovery. "Tire Fires." <http://www.calrecycle.ca.gov/Tires/Fires/>

Goodyear Tires. "Radial Tire Production." <http://www.goodycartires.com/about/testing/radial.html>

McCarthy, Tom. *Auto Mania: Cars, Consumers, and the Environment*. New Haven: Yale University Press, 2007.

Strasser, Susan. *Never Done: A History of American Housework*. New York: Henry Holt and Co., 2000.

Swicofil AG Textile Services. "Tire Production Info." <http://www.swicofil.com/tire.html>

## Instructional Support

The EEI curriculum lends itself to a wide variety of instructional connections to practices, such as outdoor education, field studies, community-based activities, and service-learning. Many agencies, institutions, and organizations throughout California have identified themselves as providing programs and materials that can be used in conjunction with this unit. Links to these resources are available at: <http://www.calepa.ca.gov/Education/EEI/Curriculum/Support.htm>

## Lesson 1



Discarded tires

# New Inventions Bring New Challenges

The “Roaring Twenties” was a time when new inventions and consumer goods began to change the lifestyles of Americans. In this lesson, students learn about some of the long-term, indirect effects on natural systems of one of these inventions—the automobile. Once large-scale manufacturing of cars began in the early 1900s, the demand for cars, and for tires, increased dramatically.

In this lesson, students first consider the intended consequences of cars and tires. Students then learn about the direct effects to natural systems from tire manufacturing. They next consider some indirect effects of tire production and disposal as they read Part 1 of *California Connections: California's*

*Waste Tire Problem*, which focuses on tire dump sites and the Tracy Tire Fire. Students discuss ways that tires and their disposal have affected natural systems indirectly, and they share their ideas for dealing with the disposal of car tires. Students then read Part 2 of *California Connections: California's Waste Tire*

*Problem* and write about the direct and indirect effects of manufacturing tires on natural systems.

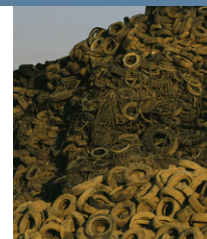
### Background

California generates approximately 30 million tires annually, and about 1.5 million are stockpiled (legally and illegally) around the state. The



## Learning Objective

Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials).



uses sulfur and other chemicals.

Today, a large tire factory produces more than 250 million new tires each year. A typical all-season passenger tire weighs about 22 pounds. It contains approximately six pounds of five different types of synthetic rubber, four-and-a-half pounds of eight types of natural rubber, five pounds of eight types of carbon black, one-and-a-half pounds of steel cord for belts, one pound of polyester and nylon, one pound of steel bead-wire, and three pounds of different kinds of chemicals, waxes, oils, and pigments. When no longer usable, these tires and all of the materials and chemicals that they contain must be managed to avoid environmental contamination. What threats do they pose, and what resources can we gather from them?

quantity of tires dumped throughout the state threatens the environment because of the potential for a major tire fire, like the one that occurred in Tracy in 1998–2000.

Tires are strong, flexible rubber casings that attach to the rim of a wheel for use on automobiles, trucks, buses, motorcycles, aircraft landing gear, tractors, forklifts, baby carriages, shopping carts, wheelchairs, and bicycles. Natural rubber is the main raw material used in manufacturing tires, although tires also contain synthetic rubber. Natural rubber is the milky liquid in the bark of the rubber tree. Synthetic rubber is made from polymers found in crude oil. American inventor Charles Goodyear accidentally discovered a process for strengthening natural rubber, known

as vulcanization, or curing, in 1839. Treatment with heat and a variety of chemicals produces sheets of rubber that are strong, resilient, and wear-resistant enough to use on products such as cars.

In addition to rubber, tires contain carbon black, a fine, soft powder created by burning crude oil or natural gas with a limited amount of oxygen. Tire manufacturing also

## Key Vocabulary

**Byproduct:** Something, such as waste materials or chemicals, produced when something else is manufactured or consumed.

**Consume:** To use economic and ecosystem goods and ecosystem services.

**Consumption:** The act or process of obtaining and using a product or resource, whether produced by a natural system or a human social system.

**Incentive:** A policy, action, or reward that motivates or inspires a person or entity to take a certain action.

**Innovation:** The act or process of creating a new way of doing things, or the resulting product or process.

**Landfill:** A solid waste disposal site where garbage is buried between layers of dirt.

**Natural system:** The interacting components, processes, and cycles within an environment, as well as the interactions among organisms and their environment.

**Remediation:** An action to reduce, isolate, or remove contamination from an environment, or to otherwise resolve an existing problem.

**Toxin:** A substance that can cause disease or damage to humans and other organisms.

**Waste:** Materials, chemicals, and products that are regarded as having no use or value, often referred to as garbage or trash.



Latex dripping from rubber tree



# Toolbox



## Summary of Activities

Students read about and view photographs of the Tracy Tire Fire in *California Connections: California's Waste Tire Problem*. They identify natural resources used to make tires and discuss direct and indirect effects of tire production and consumption on natural systems.



## Instructional Support

See Extensions & Unit Resources, pages 30–31.

### Prerequisite Knowledge



#### Students should know:

- how scientific and technological changes and new forms of energy brought about massive social, economic, and cultural change.

#### Students should be able to:

- summarize information in writing.

### Advanced Preparation



#### Gather and prepare Materials Needed.

#### Gather and prepare A-V Materials:

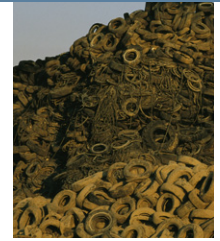
- Wall Maps:
  - Post the **Political** wall map in a location visible to all students.

#### Write discussion questions on board or chart paper:

- What are the direct and indirect effects of the manufacture and use of automobile tires on natural systems?
- How can people minimize the effects of tires on the environment?

#### Create a List of Tire Ingredients:

- On the board or chart paper, make a list of the following tire ingredients:
  - Synthetic rubber made from oil and petroleum products
  - Natural rubber
  - Steel
  - Fiberglass
  - Nylon
  - Polyester
  - Additives, such as wax and resins



## Materials Needed



### A-V Equipment:

- projection system, screen

### Class Supplies:

- chart paper (*optional*)
- colored markers
- pencils or pens
- tape or thumbtacks

### Student Edition:

- *California Connections: California's Waste Tire Problem*, pages 2–5

### Student Workbook:

- Key Unit Vocabulary, pages 2–3
- Direct and Indirect Effects of New Technologies, page 4

## Audio-Visual Materials



### Visual Aids:

- *Moving Californians*, Visual Aid #1
- *Used Tire Dump*, Visual Aid #2
- *Tracy Tire Fire*, Visual Aid #3
- *After the Tracy Tire Fire*, Visual Aid #4

### Wall Maps:

- *Political*, provided separately

## Duration



### Preparation Time

15 min.

### Instructional Time

50 min.



## Safety Notes

None

# Procedures

## Vocabulary Development

Distribute a **Student Workbook** to each student and use the **Key Unit Vocabulary** (Student Workbook, pages 2–3) to introduce new words to students as appropriate. This vocabulary will be used throughout the unit.

### Step 1

Ask students, “In the 1920s, what was the purpose of tire manufacturing?” (*Tires for use on cars, trucks, and other vehicles made work and personal travel easier.*) Project **Moving Californians** (Visual Aid #1). Ask students to imagine all the cars that pass through this interchange every day, and all the tires on those cars.

Using the **Key Unit Vocabulary**, review with students the term “consume.” Explain to students that California consumes millions of tires every year. Manufacturing tires requires several resources. Call students’ attention to the **List of Tire Ingredients** and explain to students that, initially, natural rubber, steel, chemicals, such as sulfur, and energy to heat the rubber were used in the manufacturing process. Tell students that today’s tires use synthetic rubber made from oil and petroleum products along with natural rubber. Steel, fiberglass, nylon, and polyester strengthen the tires. Additives, such as wax and resins, help preserve the tires for longer use.

### Step 2

Ask students, “Where do the resources needed to manufacture tires come from?” (*Earth, the environment*) Tell them that the term “natural system” encompasses both of these terms. Using the **Key Unit Vocabulary**, review with students the term “natural system.” Explain that deserts, forests, and oceans are all natural systems. In order to understand the consequences of tire manufacturing, we need to examine the interactions among the components and processes that make up natural systems. The components are the land, air, water, soil, minerals, plants, and animals. The processes include, for example, the creation of fossil fuels. Further, we need to examine how human practices, such as extracting, processing, and manufacturing affect natural systems.

### Step 3

Using the **Key Unit Vocabulary**, review with students the terms “byproduct,” “consumption,” “landfill,” “remediation,” “toxin,” and “waste.”

Tell students that tire manufacturing affects natural systems directly through the extraction of resources. In addition, it has many indirect consequences for natural systems, which they will read about.

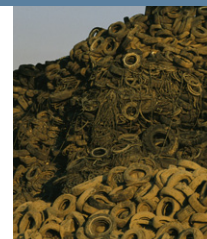
Distribute a **Student Edition** to each student. Tell them to turn to **California Connections: California’s Waste Tire Problem** (Student Edition, pages 2–5). Instruct students to read Part 1 while keeping in mind the question, “What indirect effects of manufacturing and using tires are presented in the article?”

### Step 4

When students have finished reading Part 1 of **California Connections: California’s Waste Tire Problem**, project **Used Car Tire Dump** and **Tracy Tire Fire** (Visual Aids #2–3), one at a time. For each photograph, ask the following question and record students’ answers on the board:

- What are some indirect effects of tire manufacturing presented in the article? (*No safe disposal places/methods; dump sites created for used tires; people do not care where tires are dumped; mosquitoes attracted to standing water in dumped tires; pile of tires caught on fire.*)

Explain to students that even though some of the materials used to make tires come from natural systems, the tire-making process creates products (tires) that cannot naturally be broken down by the environment into their original parts. This makes tires hard to dispose of.



## Step 5

Project **After the Tracy Tire Fire** (Visual Aid #4). Ask students the following questions:

- What are some of the concerns about tire disposal and burning raised in the article? (*Tires rise to top of waste piles because of their light weight and size; not appropriate for landfills; space in tires collects water and mosquitoes; burning causes toxic air pollutants; toxins can leach into groundwater; toxins contaminate soil; burning hard to control.*)
- Why are these concerns? (*People have tires dumped near homes—in alleys, at the border—where fires can start; we need places to dispose of worn tires; mosquitoes carry diseases; people can be harmed by breathing or drinking toxins in air and water; toxins in soil can harm animals and damage plants, including crops we consume.*)

Ask students to discuss with a partner the question at the end of Part 1 of **California Connections: California's Waste Tire Problem**, “What should we do with all of these old tires?” Have volunteers share their ideas with the class.

## Step 6

Explain to students that the California Environmental Protection Agency (Cal/EPA) is the state agency that develops, implements, and enforces the laws that protect our state's environment. The laws help to ensure clean air, clean water, clean soil, safe pesticides, and proper waste recycling and reduction. Explain that the California Integrated Waste Management Board (CIWMB) was part of Cal/EPA but, as of January 1, 2010, it became the Department of Resources Recovery and Recycling, under the California Natural Resources Agency. Its job is to manage the estimated 92 million tons of waste generated each year in California. This agency works with local governments, industry, and the public to find ways to reduce waste and dispose of it while protecting public health and the environment.

## Step 7

Using the **Key Unit Vocabulary**, review the terms “incentive” and “innovation” with students. Draw students' attention to the discussion questions written on the board (or on chart paper) and read aloud the questions to the class:

- What are the direct and indirect effects of the manufacture and use of automobile tires on natural systems?
- How can people minimize the effects of tires on the environment?

Instruct students to read Part 2 of **California Connections: California's Waste Tire Problem**, keeping in mind the two questions as they read.

## Step 8

After they complete the reading, tell students to turn to **Direct and Indirect Effects of New Technologies** (Student Workbook, page 4). Read the instructions with students and give them time to complete the task.

Gather **Student Editions**.

Collect **Student Workbooks** and use **Direct and Indirect Effects of New Technologies** for assessment.



# Lesson Assessment

## Description

**Direct and Indirect Effects of New Technologies** (Student Workbook, page 4) assesses students' achievement of the learning objective: "Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials)." To demonstrate what they have learned, students provide a written response to a prompt.

## Suggested Scoring

An Answer Key and Sample Answers for **Direct and Indirect Effects of New Technologies** are provided on page 39. There are 20 total points possible.

## Answer Key and Sample Answers

## Direct and Indirect Effects of New Technologies

## Lesson 1

Name: \_\_\_\_\_

**Instructions:** Write a 200–250 word response to the prompt below. Use information from **California Connections: California’s Waste Tire Problem** and discussions, as well as your own ideas. (20 points)

What are the direct and indirect effects of the manufacture and use of automobile tires on natural systems? How can people minimize the effects of tires on the environment?

*In today’s society, people need cars for transportation. Cars need tires for people to drive safely on roads and to prevent damage to the car. We have not yet invented ways for cars to move around without tires. To make tires, manufacturers need to extract natural resources from the environment, such as rubber, petroleum, sulfur, and metal. They also have to use energy to manufacture the tires. After the tires have been used and disposed of, they can become dangerous to natural systems by releasing toxic byproducts into the soil, groundwater, and air (if burned). Even if they are not burned, they interfere with natural systems because they cannot be buried in landfills and sit in dump sites where they often collect rainwater and attract mosquitoes.*

*Today, some tires are being retreaded and made into new tires, or they are being recycled into new products, such as roof shingles, playground materials, and speed bumps. Some tires are made into fuel, and the process also removes the toxins. Development of new ideas and uses for recycling old tires are encouraged and rewarded by the California state agency called the California Integrated Waste Management Board (CIWMB) through grants. Many more ideas for limiting the harmful effects of car tires on the environment are yet to come. For example, some shoes are now made from old tires, and people are building homes with tires packed with earth and covered in cement.*

## Key Unit Vocabulary

Lesson 1 | page 1 of 2

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**Advertising:** Activities and materials used to attract attention to a product or business.

**American landscape:** The features of the land, cultural geography, and human social systems of the United States.

**Appliance:** A device or instrument designed to perform a specific function, especially a household machine, such as a refrigerator.

**Assembly line:** An arrangement of workers, machines, and equipment placed so that a product being assembled passes consecutively from operation to operation until completed.

**Biodegradable:** Objects, materials, and chemicals that can be decomposed by bacteria and fungi.

**Byproduct:** Something, such as waste materials or chemicals, produced when something else is manufactured or consumed.

**Consume:** To use economic and ecosystem goods and ecosystem services.

**Consumption:** The act or process of obtaining and using a product or resource, whether produced by a natural system or a human social system.

**Credit:** An agreement through which a borrower receives something of value, such as money, with the promise to repay the lender.

**Cycle:** A regularly repeated event or sequence of events, that occur over time, such as the water cycle.

**Demand:** (noun) Quantity of a good or service that consumers are interested in purchasing from producers and suppliers at a given price.

**Human social systems:** The functions, processes, and interactions among individuals, human communities, and societies including political, social, cultural, economic, and legal systems.

**Incentive:** A policy, action, or reward that motivates or inspires a person or entity to take a certain action.

**Innovation:** The act or process of creating a new way of doing things, or the resulting product or process.

**Investment:** An asset purchased or held with the intention to profit from an increased value when the asset is sold.

**Landfill:** A solid waste disposal site where garbage is buried between layers of dirt.

**Landscape:** The visible features of an area of land, or an image, depicting an expanse of scenery.

**Lifestyle:** A way of life or approach to living that reflects the attitudes and values of a person or group.

**Marketing:** The process of promoting goods or services for sale.

**Mass consumption:** The act or process of consuming a large quantity of a product or resource.

**Mass production:** The act or process of producing a large quantity of goods.

**Natural system:** The interacting components, processes, and cycles within an environment, as well as the interactions among organisms and their environment.

**Plastic:** Any of various organic materials produced by polymerization that are capable of being molded, extruded, cast into various shapes and films, or drawn into filaments to be used as textile fibers.

**Processed food:** Food changed from its natural state for safety and convenience that is canned, frozen, refrigerated, or dehydrated and aseptically processed.

**Key Unit Vocabulary**Lesson 1 | page 2 of 2

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**Remediation:** An action to reduce, isolate, or remove contamination from an environment, or to otherwise resolve an existing problem.

**Suburb:** A community on the outskirts of a city, that typically includes both residential and commercial areas.

**Technology:** The application of engineering and science to resolve a problem, or the resulting product or process.

**Toxin:** A substance that can cause disease or damage to humans and other organisms.

**Waste:** Materials, chemicals, and products that are regarded as having no use or value, often referred to as garbage or trash.



# 1

## Moving Californians

Visual Aid

### VA #1 Moving Californians



## California's Waste Tire Problem

### Part 1



In August 1998, more than seven million used tires caught fire in an illegal dump outside of Tracy, California. Dense black smoke plumed to heights of 6,500 feet, carrying with it particulate matter, carbon monoxide, nitrogen oxides, heavy metals, and other toxic substances. The piles had reached as high as 50 feet and spread out over 52 acres among used oil filters, abandoned vehicles, and other refuse.

The fire started when the tire dump's owner was mowing nearby grassland. When sparks from his tractor engine ignited the grassland, flames leaped to the piles of tires. Emergency response teams decided not to extinguish the fire. They feared that water used to dampen the flames would create hazardous runoff, which could threaten groundwater. The Tracy Tire Fire burned for more than two years before firefighters finally extinguished it in December 2000. It took over five years to remove partially burned tires, debris, and more than 50,000 cubic yards of contaminated waste. Clean-up costs totaled \$18 million.

#### An Environmental Disaster

The Tracy Tire Fire was an environmental disaster resulting from the millions of used tires accumulating in California



Burning tires

since the 1920s. Tires are not classified as hazardous waste, however, once ignited, they create dense clouds of hazardous pollutants. Because tire fires are so difficult to extinguish, pollutants can be released into the air for months or years. Because of their hollow shape, about 75 percent of a tire is empty space. This space holds a large oxygen supply and even funnels air drafts throughout tire piles which "fan" a fire. Tire fires burn at very high temperatures, which forces pyrolytic oil, a tar-like substance, out of the rubber. The rubber in a tire contains approximately two gallons of oil, which, if released, can contaminate soil and water. Hazardous waste from a tire fire can also contaminate surrounding areas with arsenic, lead, and numerous other toxic compounds. This toxic waste must be contained so that it does not leach into groundwater or nearby surface water. In many cases, the contaminated soil must be removed and transported to a hazardous waste landfill.

California has more registered vehicles than any other state. A byproduct of this "car culture" is the use of a staggering number of tires. Californians generate 40.8 million used tires annually, some of which could



Discarded tires

be reused. Another 1.5 million old tires are held in illegal stockpiles where they provide a habitat for rodents and other pests, such as mosquitoes, that breed in rainwater that collects in the used tires. Tires, unless processed, may not be disposed of in municipal landfills, where they can rise to the top of the waste pile because of their relatively light weight. Whether in landfills or illegal stockpiles, used tires create a fire hazard. Illegal dumping of waste tires is a problem in many parts of the country, and California is no exception.

#### A Mounting Problem

People often travel to impoverished areas, such as inner-city alleyways and rural areas, to dump used tires. Some people dump their old tires because they simply do not know about the hazards they create. Others dump the old tires because they do not care, as long as the tires are gone from their backyards. Major environmental disasters like the Tracy Tire Fire, remind us of just how dangerous it is to stockpile used tires.

Californians will consume approximately 200 million tires

over the next five years. This means we will have 200 million additional waste tires to manage. As our population grows and more people drive on highways every year, an important question remains, What should we do with all of these old tires?

### Part 2

The California Integrated Waste Management Board (CIWMB) is one of six agencies under the umbrella of the California Environmental Protection Agency (Cal/EPA). The CIWMB is responsible for the collection, transportation, processing, recycling, or disposal of waste materials in California. Managing waste tires is one of CIWMB's jobs. This State entity has an active role in reducing landfill waste and stockpiling, in recycling material from used tires, and in protecting public health and the environment.

Each year, the CIWMB successfully diverts more than 30 million used tires from stockpiles or landfills. The CIWMB provides money to local governments to recover waste tires from the public. It also pays for the development of public education materials to raise public awareness about the problem of waste tires in California.



Crumb rubber

Once waste tires are collected, they can be reused, retreaded, or recycled. If tires still have a legal tread depth, they can be reused. Each year about two million used tires are sold and reused. Tires can be retreaded if they are too worn down for reuse. California has more than 50 retread plants, which sell millions of retreaded tires each year.

One of the main ways the CIWMB keeps tire waste out of landfills is by developing markets for recycled tire materials. It funds research projects to find new uses for tire products,

as well as provides economic incentives to local governments and businesses to use and manufacture recycled-tire products. One such product is crumb rubber, which can be used for playground turf, speed bumps, carpet tiles, mats, sound barriers, and molded rubber products. Rubberized asphalt can be used to repave roads. It is more durable and smoother than conventional asphalt and helps reduce traffic noise. Tire shreds have been used to build highway retaining walls as well as dampen the sound in light-rail

systems. Tires are also burned for fuel, most of which is used in the cement manufacturing industry. The public can support such new uses of old tires by buying tire-derived products, such as playground equipment, roof shingles, and new tires made from recycled rubber.

The CIWMB also plays a major role in the cleanup and remediation of tire dumps, as well as in the tracking and law enforcement actions needed to prevent such dumps. The CIWMB began remediating old tire piles in 1994, and it has removed over 771,128 tons of illegal waste tires and contaminated trash from 60 sites. Cleanup involves stabilizing tire piles, removing

and transporting tires to a facility where they can be recycled, and removing any leftover toxic wastes. The total cost of site remediation has been \$40 million. Most of this money was spent on major tire fires, such as the one in Tracy.

The CIWMB works with local law enforcement and highway patrol agencies to stop illegal tire dumping, which is concentrated in U.S. border regions. Some of the tools they use to monitor illegal tire dumping include satellite technology and motion-activated surveillance. The Waste and Used Tire Hauler and Manifest Program requires waste haulers to register and record each tire transaction. This

tracking system helps to monitor the flow of waste in the state.

When Cal/EPA, local governments, law enforcement agencies, private businesses, and an educated public work together, tires can be reused, retreaded, or recycled to make many useful products. Used tires are not just a waste product to be discarded. Instead, when handled properly, they can become a valuable resource.

*Note: As of January 1, 2010, the California Integrated Waste Management Board became the Department of Resources Recovery and Recycling, under the California Natural Resources Agency.*



Illegally dumped tires



2

## Used Tire Dump

Visual Aid

### VA #2 Used Tire Dump





3

**Tracy Tire Fire**

Visual Aid

**VA #3 Tracy Tire Fire**

# 4

## After the Tracy Tire Fire Visual Aid

### VA #4 After the Tracy Tire Fire









## Lesson 2



Assembly-line workers, ca. 1916

# The Rise of Mass Production

**T**his lesson introduces students to the concepts of mass production and mass consumption as important factors influencing the growth and change of American life during the 1920s. A lecture provides information on inventions of the early 1900s and describes how historical and scientific events, combined with available natural resources, fuel the mass production of these new inventions.

Students participate in a class discussion and complete a graphic organizer to identify the relationship between science, events, the natural environment, mass production, and mass consumption during the early twentieth century. Students will use this graphic organizer throughout the unit to understand the cycle of mass production and consumption. Students then analyze

one mass-produced invention—the automobile—and describe the natural resources required for its manufacturing, the intended and unintended consequences (including byproducts) of manufacturing and using this product, and the associated effects of such activity on natural systems. In the next lesson, students will analyze other mass-produced inventions.

### Background

“Mass production” refers to methods of making large quantities of goods at a low per-unit cost. This approach to manufacturing, with its use of interchangeable parts and mechanization, standardized production and improved product quality. Using an organized flow of materials in various stages of manufacturing, careful supervision



## Learning Objective

Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems.



the 1920s. By the end of the decade, nearly half the population owned cars, radios, and durable consumer goods, such as vacuum cleaners and washing machines. As interest in consumer goods increased, the consumption of natural resources and the byproducts created during the production process also increased. Scientific knowledge was used to develop technology, such as tractors and power tools, which are used for consumer goods. These developments allowed for the massive expansion of resource extraction and processing.

of standards, and specialized division of labor, these changes also resulted in higher production rates.

The nineteenth-century development of precision machine tools (and electric motors to run them) to make large numbers of identical parts reliably and cheaply laid the groundwork for mass production. Henry Ford popularized mass production in the early twentieth century by building the Model T using moving assembly lines. Assembly lines enhanced mass production by optimizing the amount of time and skill used to create a finished product. Workers or items moved along a line to collectively assemble a product instead of each worker assembling the product individually. This innovative staffing strategy capitalized on low-skill and high-production work as employees learned simple, repetitive actions that contributed to the building of the final product.

Mass production required mass consumption in order to be profitable, and until the 1920s, the major sources of mass consumption were military units. In times of war, manufacturers found ways to quickly and efficiently mass-produce such products as fire-arms, ammunition, poison gases, and boots. New technological developments associated with military

activities, such as weapons, radios, and airplanes, were soon adapted for civilian purposes and marketed to the public. In addition, inventions that focused on individual needs and time-saving and labor-saving opportunities—such as adhesive bandages, wristwatches, and hair dryers—became mass-produced, especially as more homes obtained electricity and indoor plumbing. Manufacturing in America rose 60 to 70% during



Early vacuum cleaner, ca. 1917

## Key Vocabulary

**Appliance:** A device or instrument designed to perform a specific function, especially a household machine, such as a refrigerator.

**Assembly line:** An arrangement of workers, machines, and equipment placed so that a product being assembled passes consecutively from operation to operation until completed.

**Mass consumption:** The act or process of consuming a large quantity of a product or resource.

**Mass production:** The act or process of producing a large quantity of goods.

**Processed food:** Food changed from its natural state for safety and convenience that is canned, frozen, refrigerated, or dehydrated and aseptically processed.

**Technology:** The application of engineering and science to resolve a problem, or the resulting product or process.

# Toolbox



## Summary of Activities

Students learn about inventions, mass production, and mass consumption, and then summarize basic ideas in a graphic organizer. Using cars as an example, they begin a chart that analyzes the intended and unintended consequences and environmental effects of mass-produced consumer goods.



## Instructional Support

See Extensions & Unit Resources, pages 30–31.

### Prerequisite Knowledge



#### Students should know about:

- the transformation of the U.S. economy and the changing social and political conditions in the United States in response to the Industrial Revolution.

#### Students should be able to:

- analyze cause and effect.
- take notes on a lecture.

### Advanced Preparation



#### Gather and prepare Materials Needed.

#### Gather and prepare A-V Materials.

#### Read Lecture Notes:

- Prior to the lesson, read over **Mass Production Lecture Notes** on page 54.



## Materials Needed



### A-V Equipment:

- projection system, screen

### Class Supplies:

- pencils or pens

### Student Edition:

- Inventions Timeline, page 6

### Student Workbook:

- Rise of Mass Production and Mass Consumption, pages 5–6
- Mass-produced Inventions Chart, pages 7–9

## Audio-Visual Materials



### Visual Aids:

- Automobile Assembly Line, 1913, Visual Aid #5
- Inventions Timeline, Visual Aid #6
- Car Advertisement, Visual Aid #7

## Duration



### Preparation Time

15 min.

### Instructional Time

50 min.



## Safety Notes

None

# Procedures

## Vocabulary Development

Redistribute the students' individual **Student Workbooks** and use the **Key Unit Vocabulary** to introduce new words to students as appropriate.

### Step 1

Remind students that the previous lesson addressed some indirect effects of one invention that emerged during the 1920s—the automobile tire. Review the lesson by asking students the following questions:

- What are some indirect effects of car tire manufacturing? (*Disposal of tires is difficult, they take up lots of space in landfills; people dump tires illegally, piles of tires attract mosquitoes; when tire dumps catch fire, the fires can burn for years, causing pollution and harm to the environment.*)
- Do you think car tire manufacturers intended these effects when they first produced the tires? (*No, they intended for tires to be used for cars and other vehicles.*)

Explain that often, social or economic progress, change, and growth have unintended consequences that have indirect effects on the environment. Tell students that the tire problem resulted from new technologies that emerged during the 1920s and the available natural resources.

### Step 2

Using the **Key Unit Vocabulary**, review the terms “appliance,” “assembly line,” “mass consumption,” “mass production,” “processed food,” and “technology” with students. Project the **Automobile Assembly Line, 1913** (Visual Aid #5). Using **Part 1 of Mass Production Lecture Notes** (provided on page 54), give students an overview of mass production and the development of the assembly line.

### Step 3

Tell students that a variety of inventions and new technologies emerged in the early 1900s and after World War 1. Distribute a **Student Edition** to each student. Tell them to turn to **Inventions Timeline** (Student Edition, page 6). Project **Inventions Timeline** (Visual Aid #6). Review the inventions and timeline with students. During the review, ask students, “Which of these items do you use? How do these items affect your personal lives?”

### Step 4

Using **Part 2 of Mass Production Lecture Notes** (provided on page 54), give students an overview of the need for natural resources in the production of these new products.

Explain that while new technologies and the extraction and transportation of natural resources led to mass production and mass consumer buying, they also affected the environment. The effects on the environment will be explored throughout the unit by considering some of the costs to the environment including:

- Byproducts from the manufacturing process.
- Resource conservation and waste management related to product manufacturing and the disposal of products when they stopped working or the consumer decided to replace one item with another.
- Disposal of the waste materials and alternatives related to conservation, recycling and reuse of resources.





## Step 5

Tell students to turn to **Rise of Mass Production and Mass Consumption** (Student Workbook, pages 5–6). Read the instructions and complete the flowchart as a class, using the information from the lecture. (Note: *An Answer Key and Sample Answers for Rise of Mass Production and Mass Consumption* are provided on pages 56–57.)

## Step 6

Tell the class that now you will focus on one new invention of the 1920s, the mass-produced automobile. Project **Car Advertisement** (Visual Aid #7), and ask students the following questions:

- Cars may have been available and affordable to many in the 1920s, but they still cost a lot of money. Why did so many Americans respond to advertisements like this one and purchase automobiles? (*It was new and exciting; made life easier; people wanted to have what others had; they could afford this new invention; they had just finished a war and wanted to live the good life.*)
- People have continued to buy more cars since the 1920s. How has the automobile affected the lives of Americans since the 1920s? (*People rely on automobiles every day for work, shopping, transportation; people can live farther away from their jobs, people enjoy the variety of cars in different makes and models; we have developed drive-thru restaurants; music and entertainment systems are found in cars; car accidents take lives; many laws have been created to keep people safe in cars.*)
- What were some of the intended consequences of car ownership? (*Reliable transportation, enjoyment*)
- What were some unintended consequences? (*Car accidents, development of drive-thru restaurants, interstate freeways*)
- Besides the problems with tires, what other unintended consequences of the automobile have affected natural systems? (*Air pollution, increased reliance on oil, expansion of roads and interstates, fragmented habitat for wildlife, road kills, abandoned cars, contaminated runoff from car washing and leaking engines, contaminated soil and groundwater from gas station underground storage tank leaks*)

## Step 7

Tell students to turn to **Mass-produced Inventions Chart** (Student Workbook, pages 7–9). Review the column headings and complete the first row as a class. Explain to students that during the next few classes, they will examine other mass-produced inventions of the 1920s and complete the remainder of the chart. (Note: *An Answer Key and Sample Answers for Mass-produced Inventions Chart* are provided on pages 62–64. The answer rows below “automobile” apply in Lesson 3.)

Gather **Student Editions**.

Collect **Student Workbooks** and use **Rise of Mass Production and Mass Consumption** for assessment.

## Mass Production Lecture Notes

### Part 1: Mass Production and the Assembly Line

In the 1920s, a new process called “mass production” helped to make products more available and affordable. Mass production, which is the manufacturing of goods in large, or mass, quantities, is associated with factories and an innovation called the “assembly line.”

- a. In this system, tracks or conveyor belts move partially completed products through a series of worker stations.
- b. At each station, the workers perform one or more tasks that contribute to the development of that product. For example, in building a car, the task might involve installing a steering wheel or mounting tires.
- c. This system allows for a high rate of production because the product keeps moving and only stays at each station long enough to have the assigned tasks performed.
- d. Workers’ stations match their training and abilities.
- e. Each worker contributes to a part of the assembly process.
- f. This process standardizes the product, and consumers can count on the products all being the same in the end, unless a mistake occurs on the assembly line.
- g. This system also keeps costs low for the manufacturer.
  - i. Rather than paying high salaries to skilled, experienced workers who specialize in making complete products, mass production breaks down the job into smaller parts that do not require as much skill or experience.
  - ii. In the end, workers make more products at a faster rate and for less cost. The low cost and the large number of products keep the price lower than it would be if each product were produced individually.

### Part 2: Mass-Produced Inventions and the Need for Natural Resources

While some inventions appeared before World War I, for example, tractors and vacuum cleaners, many were not widely produced and used by the public until years later. After WWI ended, new inventions emerged. Improvements in transportation systems made before the war allowed raw materials to be moved more easily and more products to be made.

- a. Materials needed for production could be moved to industrialized cities.
- b. Manufacturers could produce items in places far from the natural resources required to make them.
- c. Examples of raw materials transported include iron ore, minerals, logs, and crude oil.
- d. Car manufacturers transported aluminum, carbon, copper, iron ore, lead, magnesium, manganese, nickel, petroleum, quartz sand, silicon, and zinc ore to the factories that manufactured cars.
- e. Improved transportation systems moved products made in industrialized cities to consumer markets all around the world.
  - i. Consumers did not have to go to Michigan, where Henry Ford made Model Ts on an assembly line, in order to buy a car.
  - ii. After building the car, the manufacturers would ship their products to places around the world where people could buy them close to their homes.
- f. Other mass-produced items included clocks, watches, weapons, processed foods, and various household appliances.
- g. The more available, affordable, and convenient the products were for the consumers, the more these products were socially desirable for consumers to purchase.
- h. Mass production led to mass consumption.



## Lesson Assessment

### Description

**Rise of Mass Production and Mass Consumption** (Student Workbook, pages 5–6) assesses students’ achievement of the learning objective: “Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems.” To demonstrate what they have learned, students complete a flowchart.

### Suggested Scoring

An Answer Key and Sample Answers for **Rise of Mass Production and Mass Consumption** are provided on pages 56–57. There are 15 total points possible.

## Answer Key and Sample Answers

### Rise of Mass Production and Mass Consumption

Lesson 2 | page 1 of 2

---

Name: \_\_\_\_\_

**Instructions:** Use information from today's lesson and the guide below to complete the flowchart on the next page.

#### Flowchart Guide

**In the “Science and Events” space:**

List at least three events or advances in science and technology prior to the 1920s that influenced mass production. (1 point each)

**In the “Natural Environment” space:**

List at least three examples of resources extracted from the natural environment to support mass production. (1 point each)

**In the “New Products Produced” space:**

Identify at least five examples of new products produced in the 1920s. (1 point each)

**In the “New Products Consumed” space:**

Describe how mass consumption affected new product production, science, and events. (2 points)

Describe how mass consumption affected the natural environment. (2 points)



## Answer Key and Sample Answers

## Rise of Mass Production and Mass Consumption

Lesson 2 | page 2 of 2

Name: \_\_\_\_\_

**Science and Events***Industrial Revolution, inventions,**improvements to transportation,**World War I, new technologies***Natural Environment***Iron ore, minerals, logs, crude oil***New Products Produced***Cars, frozen foods, electric shavers, adhesive bandages, traffic signals, mechanized**televisions, aerosol cans, electric refrigerator***New Products Consumed**

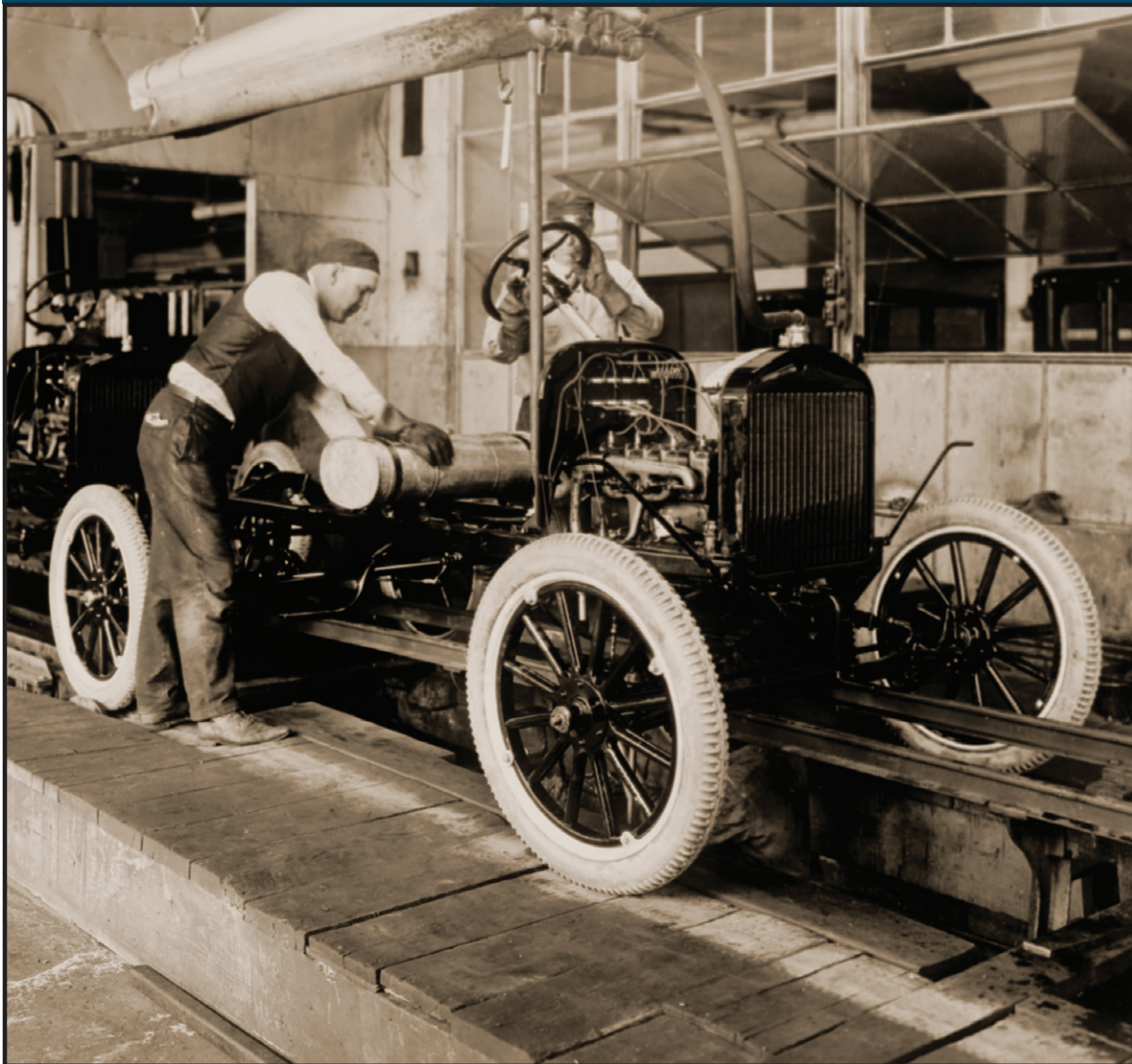
*More products required more natural resources or raw materials; extraction of more natural resources created more damage to or effects on natural systems; more movement of increased raw materials required more fuel from natural sources; more production in factories meant more jobs and more profits; more jobs for more people increased the population in industrialized cities; more population placed greater demands on the natural systems in and around the cities; increased demand for products prompted development of new products or improvements to existing products.*

5

## Automobile Assembly Line, 1913

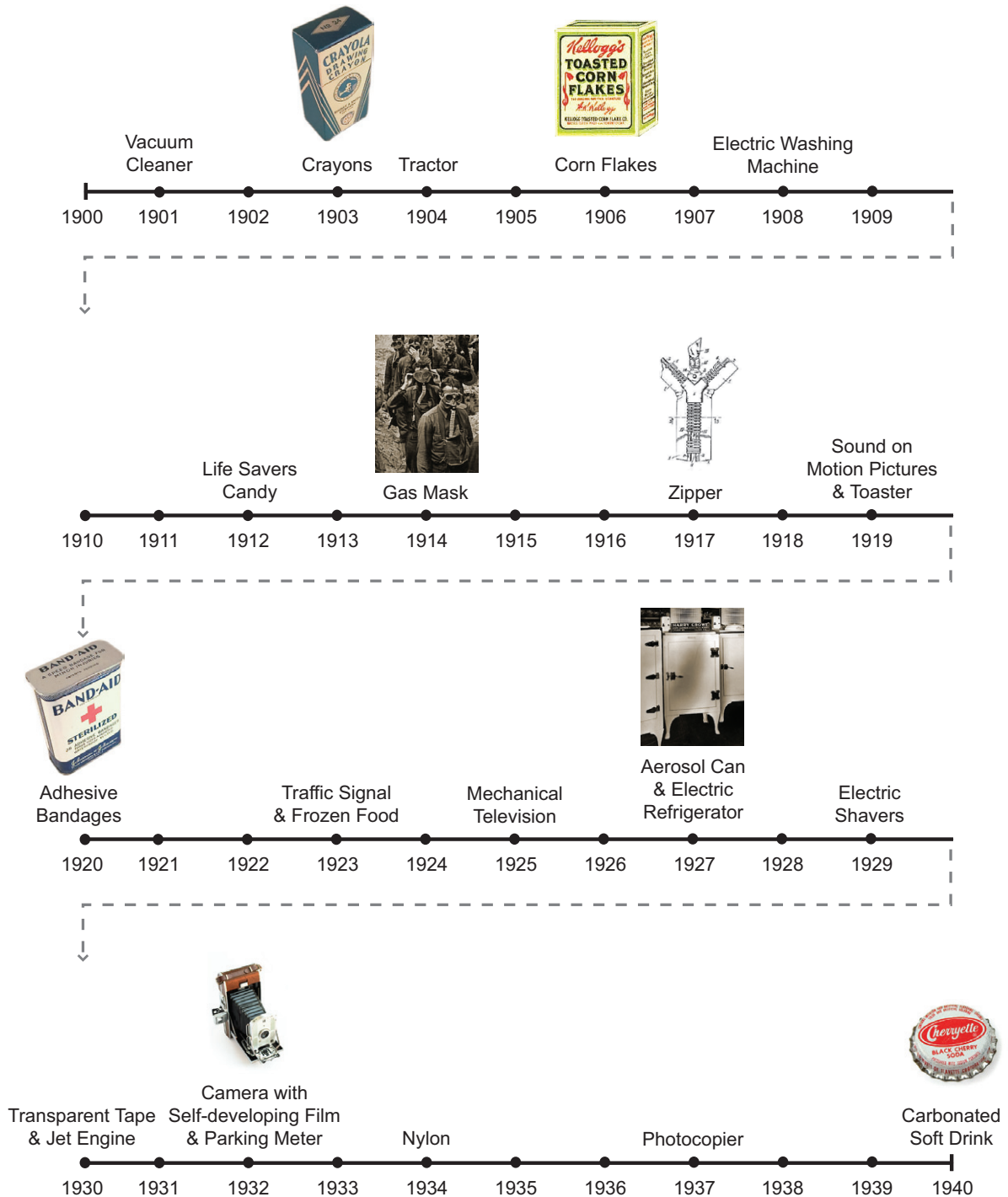
Visual Aid

### VA #5 Automobile Assembly Line, 1913



## Inventions Timeline

## Lesson 2

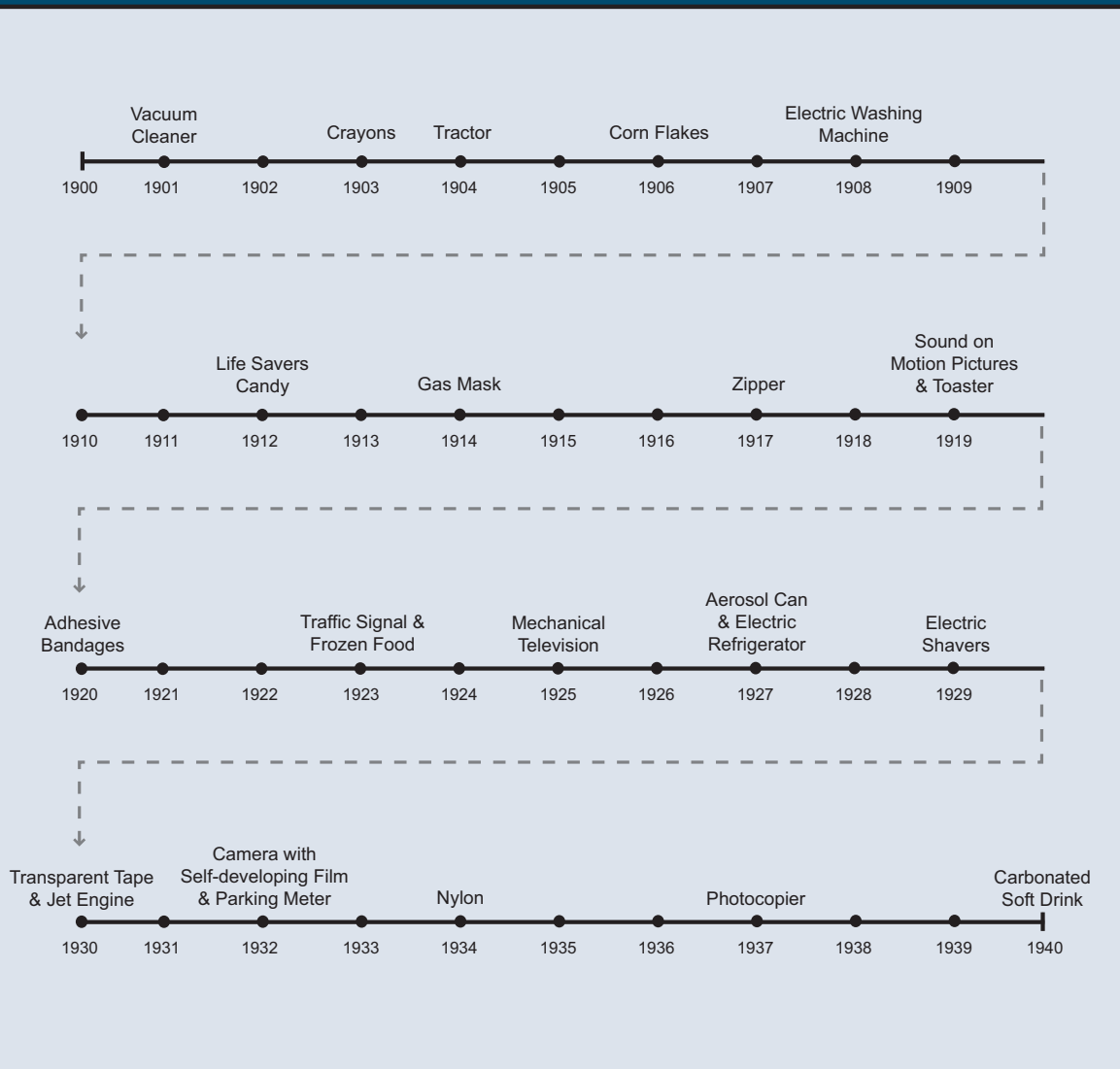


# 6

## Inventions Timeline

Visual Aid

### VA #6 Inventions Timeline





7

## Car Advertisement

Visual Aid

## VA #7 Car Advertisement

# Ford

## Peak Production To Meet Record Sales

Demand for improved Ford cars during September established a sales record.

To meet this demand, Ford production is rapidly approaching a new peak, which insures early delivery.

Go to the nearest Authorized Dealer today and have him explain the many improvements that have been made.

Easy payment terms will gladly be arranged to suit your convenience.

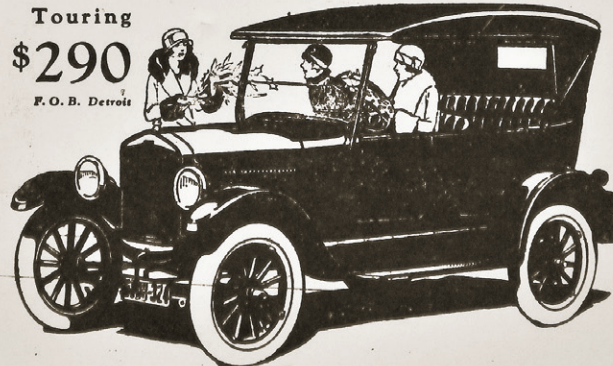
RUNABOUT . . . \$260	COUPE . . . \$520
TUDOR SEDAN . . . 580	FORDOR SEDAN . . . 660

Closed cars in color. Demountable rims and starter extra on open cars.  
All prices f. o. b. Detroit.

FORD MOTOR COMPANY, DETROIT, MICHIGAN

Touring  
\$290

F. O. B. Detroit



## Answer Key and Sample Answers

### Mass-produced Inventions Chart

Lesson 2 | page 1 of 3

Name: \_\_\_\_\_

**Instructions:** Follow your teacher's direction to complete the chart below. (24 points possible)

Mass-produced Invention	Natural Resources Required for Production in 1920s	Intended Consequences	Unintended Consequences (including byproducts)	Effects on Natural Systems (good, bad, neutral)
<b>Automobile</b>	<i>Aluminum, carbon, copper, iron ore, lead, magnesium, manganese, nickel, petroleum, quartz sand, rubber, silicon, textiles (cotton, animal skins), zinc ore</i>	<i>Reliable transportation, enjoyment, ease of moving people and goods, improvement to quality of life</i>	<i>Car accidents, need for car insurance, reliance on oil, air pollution, junkyards for car/parts disposal, drive-thru restaurants</i>	<i>Air pollution, water pollution, soil pollution, oil drilling, depleting nonrenewable energy sources, road-building, less dusty roads after paving</i>
<b>Alarm Clock</b>	<i>Metal, glass, ink, or resources to make paint</i>	<i>Keep time, allow people to be on time, allow people to wake up on time</i>	<i>Scrap metals as byproducts from production, disposal of clocks for new models</i>	<i>Mining of metals, disposal of metals in landfills</i>
<b>Camera</b>	<i>Metal, glass, leatherette (paper, cotton), resources to make film</i>	<i>Take photographs, provide records and memories</i>	<i>Chemicals needed for processing photographs, lots of paper used for photographs</i>	<i>Cameras record images of natural systems; mining of metals</i>

## Answer Key and Sample Answers

## Mass-produced Inventions Chart

Lesson 2 | page 2 of 3

Name: \_\_\_\_\_

Mass-produced Invention	Natural Resources Required for Production in 1920s	Intended Consequences	Unintended Consequences (including byproducts)	Effects on Natural Systems (good, bad, neutral)
<b>Canned Food and Beverages</b>	<i>Tin, steel, iron, food (vegetables, fruit, juice, meat)</i>	<i>Preserve food, keep food safe from spoiling, transport food easily and safely</i>	<i>Diets changed to adjust to canned foods, disposal of many cans</i>	<i>Mining of metals, disposal in landfills</i>
<b>Lightbulb (incandescent)</b>	<i>Glass, metal, tungsten, inert gas (argon, neon, nitrogen)</i>	<i>Controllable light in homes and businesses, affordable resource</i>	<i>Consumes large amounts of energy, contributes to global climate change</i>	<i>Safer than candles/fire, conserves firewood, high consumption of energy, contributes to global climate change</i>
<b>Telephone</b>	<i>Wood or zinc alloy, metal, carbon</i>	<i>Allows people to communicate; people can give or get help in emergencies</i>	<i>Telephone lines to connect system, conversion to plastics, disposal for new models</i>	<i>Wood used to build telephone poles, metals used for telephone lines, lines across landscapes</i>

Mass-produced Inventions Chart

Lesson 2 | page 3 of 3

Name: \_\_\_\_\_

**Instructions:** Use information from the completed chart to answer the following question. (5 points)

What was the role of marketing and credit in the production and purchase of consumer goods in the 1920s?

*In the 1920s, manufacturers started to market their products to the public. They used advertisements to influence consumers to buy their products by trying to convince them that the products would improve the quality of their lives. Paying by installments or using credit allowed consumers to purchase items even if they did not have money at that time. Using credit, consumers could buy items and pay later. Marketing and credit allowed more consumers to buy products, which then stimulated the demand for more products.*







## Lesson 3



Shoppers at storefront, 1922

# A Rise in Mass Consumption

**M**ass production is only successful and financially sustainable if consumers respond with mass consumption. In this lesson, students learn how marketing and credit stimulated demand for products, and how investments promoted the development of new and improved products to meet consumer demand.

Students examine a chart depicting the cyclical relationships between mass consumption and mass production. They discuss how increased production and consumption increased the demand for the natural resources needed for product development. Increased demand for natural resources affected natural systems both immediately and long-term.

Working in small groups, students read about mass-produced items and analyze advertisements from the 1920s featuring those items. Students identify natural resources used to produce the items, the intended and unintended consequences of the products, their effects on the environment, and the advertising concepts used to promote them. Students share and compile their

findings in a chart and write about the role of marketing and credit in the production and purchase of consumer goods in the 1920s.

### Background

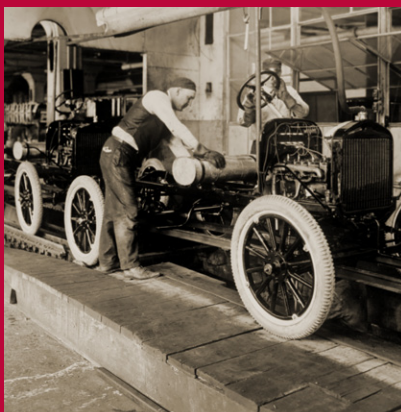
The 1920s saw a rapid acceleration of the cycle of mass production and consumption. Why did the consumption of new products increase so quickly? Two factors responsible for



## Learning Objectives

Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems.

Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials).



promoted the popularity of the car, and credit made the car more affordable to working-class families. Although the cost of automobiles decreased due to mass-production techniques, approximately 75% of consumers in 1925 used installment plans to purchase cars.

While advertising in America dates back to colonial times, advertising volume grew from \$200 million in 1880 to nearly \$3 billion in 1920. National advertising of branded goods grew with the rise of department stores, the expansion of mail-order catalogues, and the increase in mass-circulation magazines. People began to recognize branded products and purchase them—first in cities and eventually throughout the country. Advertisements promoted goods to engage Americans in leisure-time activities, such as movies and sports, and they encouraged the celebration of prosperity through the acquisition of material goods. Marketing campaigns sought to convince hard-working Americans that they needed and deserved the many new products being mass-produced.

this rapid expansion remain part of the U.S. economic landscape today—credit and advertising.

Economist Thorstein Veblen published *The Theory of the Leisure Class* in 1898. The book reached a wide U.S. audience during the 1920s because it spoke directly to the psychology of U.S. consumption: Americans wanted to get rich, and they wanted to do so with little effort. Veblen introduced the now-familiar term “conspicuous consumption,” which seemed to embody the cultural

mindset of post-World War I America. Conspicuous consumption describes lavish spending on goods acquired mainly for displaying wealth.

The list of goods produced and consumed in mass quantities during the 1920s is extensive. Some examples include the radio, automobiles, new electrical appliances, processed foods, and the frequent purchase of tickets to motion pictures. Annual automobile production rose from 2 million during the early 1920s to 5.5 million in 1929. Advertising



Woman adjusting radio, ca. 1920

## Key Vocabulary

**Advertising:** Activities and materials used to attract attention to a product or business.

**Credit:** An agreement through which a borrower receives something of value, such as money, with the promise to repay the lender.

**Cycle:** A regularly repeated event, or sequence of events, that occur over time, such as the water cycle.

**Demand:** (noun) Quantity of a good or service that consumers are interested in purchasing from producers and suppliers at a given price.

**Investment:** An asset purchased or held with the intention to profit from an increased value when the asset is sold.

**Marketing:** The process of promoting goods or services for sale.

# Toolbox



## Summary of Activities

Students use a chart to explore the rise of mass production and mass consumption. In small groups, they discuss and analyze ads from the 1920s and compile information about several products. They then write about the influence of marketing on consumer decisions.



## Instructional Support

See Extensions & Unit Resources, pages 30–31.

### Prerequisite Knowledge



#### Students should know about:

- the transformation of the U.S. economy and the changing social and political conditions in the United States in response to the Industrial Revolution.
- the significant inventors and their inventions from the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, and how they improved the quality of life.

#### Students should be able to:

- draw upon prior knowledge and experience to analyze goods for their intended and unintended uses as well as materials used to develop the product.
- analyze advertisements for information and interpretation.

### Advanced Preparation



#### Gather and prepare Materials Needed.

#### Gather and prepare A-V Materials:

- Gather from previous lessons:
  - Car Advertisement, Visual Aid #7

#### Write discussion questions on board or chart paper:

- What do you see in this advertisement?
- How does the advertisement make you feel?
- What do you think about when you see this advertisement?





## Materials Needed



### A-V Equipment:

- projection system, screen

### Class Supplies:

- chart paper (*optional*)
- colored markers
- pencils or pens
- tape or thumbtacks (*optional*)

### Student Edition:

- Inventions Information Sheet, pages 7–9

### Student Workbook:

- Mass-produced Inventions Chart, pages 7–9

## Audio-Visual Materials



### Information Cards:

- Camera Advertisement, Information Card #1
- Telephone Advertisement, Information Card #2
- Alarm Clock Advertisement, Information Card #3
- Canned Food Advertisement, Information Card #4
- Lightbulb Advertisement, Information Card #5

### Visual Aids:

- Mass Production and Consumption Cycle, Visual Aid #8
- Advertisement Guiding Questions, Visual Aid #9

## Duration



### Preparation Time

10 min.

### Instructional Time

50 min.



## Safety Notes

None

# Procedures

## Vocabulary Development

Redistribute the students' individual **Student Workbooks** and use the **Key Unit Vocabulary** to introduce new words to students as appropriate.

### Step 1

Review information from the previous lesson by asking the following questions:

- What is mass production? (*The production of goods in large, or mass, quantities.*)
- What is mass consumption? (*The act or process of consuming in large, or mass, quantities.*)
- What led to the rise of mass production? (*Scientific inventions/new technologies, Industrial Revolution, World War I, better transportation systems, available raw materials from the natural environment*)
- What led to mass consumption? (*Mass production, available and affordable products*)
- What were some effects of mass consumption? (*Increased demand for products and profits; more extraction of natural resources to meet demands; more inventions to improve products or create new products; more jobs for workers in industrialized cities; larger city populations; increased demands on natural systems in and around cities.*)

Tell students to turn to **Rise of Mass Production and Mass Consumption** (Student Workbook, pages 5–6) for review, if necessary.

### Step 2

Using the **Key Unit Vocabulary**, review the terms “advertising,” “credit,” “cycle,” “demand,” “investment,” and “marketing” with students. Project **Mass Production and Consumption Cycle** (Visual Aid #8). Have students examine this cycle independently, and then turn to a partner to explain the cycle to each other. After a few minutes, have volunteers share their explanations with the class. (*New products are produced → marketing and credit prompt consumers to demand more products → consumers buy and use these products → investors influence the development of more/better products → more products are produced, and the cycle repeats itself.*) Correct any misconceptions.

### Step 3

Using the **Mass Production and Consumption Cycle**, explain to students that marketing and credit stimulated the demand for more products. Marketing and advertising introduced new products to people and often influenced them to believe that their lives would be better with these items. The introduction of credit allowed interested consumers to borrow money to make their purchases with the promise to repay the funds later (often with interest added). Credit was further refined in the 1920s with the advent of “installment plans,” which made use of credit very attractive to consumers.

### Step 4

Continue to explain to students that investments fueled the development of new products in the areas where consumer demand was the greatest. Investors provided money to manufacturers for product research, development, and production. When the product sold, the manufacturers returned a percentage of those sales to the investors. Some investors made a lot of money this way!



## Step 5

Tell students to turn to **Mass-produced Inventions Chart** (Student Workbook, pages 7–9). Review the chart headings and the row with the example of the automobile. Explain to students that they will complete the rest of the chart today with information about other key inventions of the 1920s.

Organize the class into five groups. Distribute one of the following to each group: **Camera Advertisement** (Information Card #1), **Telephone Advertisement** (Information Card #2), **Alarm Clock Advertisement** (Information Card #3), **Canned Food Advertisement** (Information Card #4), or **Lightbulb Advertisement** (Information Card #5).

Explain that each advertisement shows a mass-produced and mass-consumed invention from the 1920s. Instruct each group to analyze and discuss the item advertised in their group's information card. Project **Advertisement Guiding Questions** (Visual Aid #9) and tell students to use these guiding questions in their group discussions.

Distribute a **Student Edition** to each student. Instruct them to turn to **Inventions Information Sheet** (Student Edition, pages 7–9) and read about the invention their group was assigned. Tell students to complete the row, on their copy of **Mass-produced Inventions Chart**, that matches the advertisement their group received, and prepare to tell the rest of the class about it. Allow 10 minutes for the groups to complete this task.

## Step 6

When time is up, have one member from each group briefly report the group's findings to the class while the rest of the class takes notes to complete their individual **Mass-produced Inventions Chart**, that matches the advertisement their group received. Have students direct questions about each invention to group members. Encourage students to add their insights or background knowledge about any of the inventions presented by other groups. (*Note: Make sure that each group addresses the issues of waste generated in the manufacturing and disposal of these items.*)

## Step 7

Facilitate a discussion about the information presented and accumulated on the chart. (*Note: An Answer Key and Sample Answers for Mass-produced Inventions Chart is provided as part of Lesson 2 on pages 62–64.*) Thousands of these items were manufactured and sold beginning in the 1920s. Ask students, "What were the effects on natural systems?" (*Many natural resources were used, even depleted in some areas; mining, factory building, and transportation of goods altered natural environments; chemical byproducts were released in soil, water, and air; landfills received more waste as items were discarded.*)

## Step 8

Project **Car Advertisement** (Visual Aid #7). Refer students to the discussion questions written on the board, and initiate a class discussion based on the following questions:

- What do you see in this advertisement? (*A brand new car from Ford with information about where it can be purchased.*)
- What does the text in the ad say? (*Read the ad.*)
- How does the advertisement make you feel? (*Carefree; calm, relaxed; happy for the people in the ad*)
- What do you think about when you see this advertisement? (*These women are probably friends; women can drive cars; cars make it possible to get out and enjoy life.*)



## Step 9

Tell students that advertising and marketing connected mass production to mass consumption in the 1920s. Have students in their groups look again at their information cards and use the questions on the board to analyze and discuss the advertisement their group has been assigned. Instruct students to write a brief response to the question on page 3 of **Mass-produced Inventions Chart**.

## Step 10

Project the **Mass Production and Consumption Cycle** again and have a volunteer explain the cycle to the class. Reiterate that marketing, advertising, and credit were powerful tools used to sell mass-produced goods to the American public in the 1920s, just as they are today.

Gather **Student Editions** and information cards.

Collect **Student Workbooks** and use **Mass-produced Inventions Chart** for assessment.



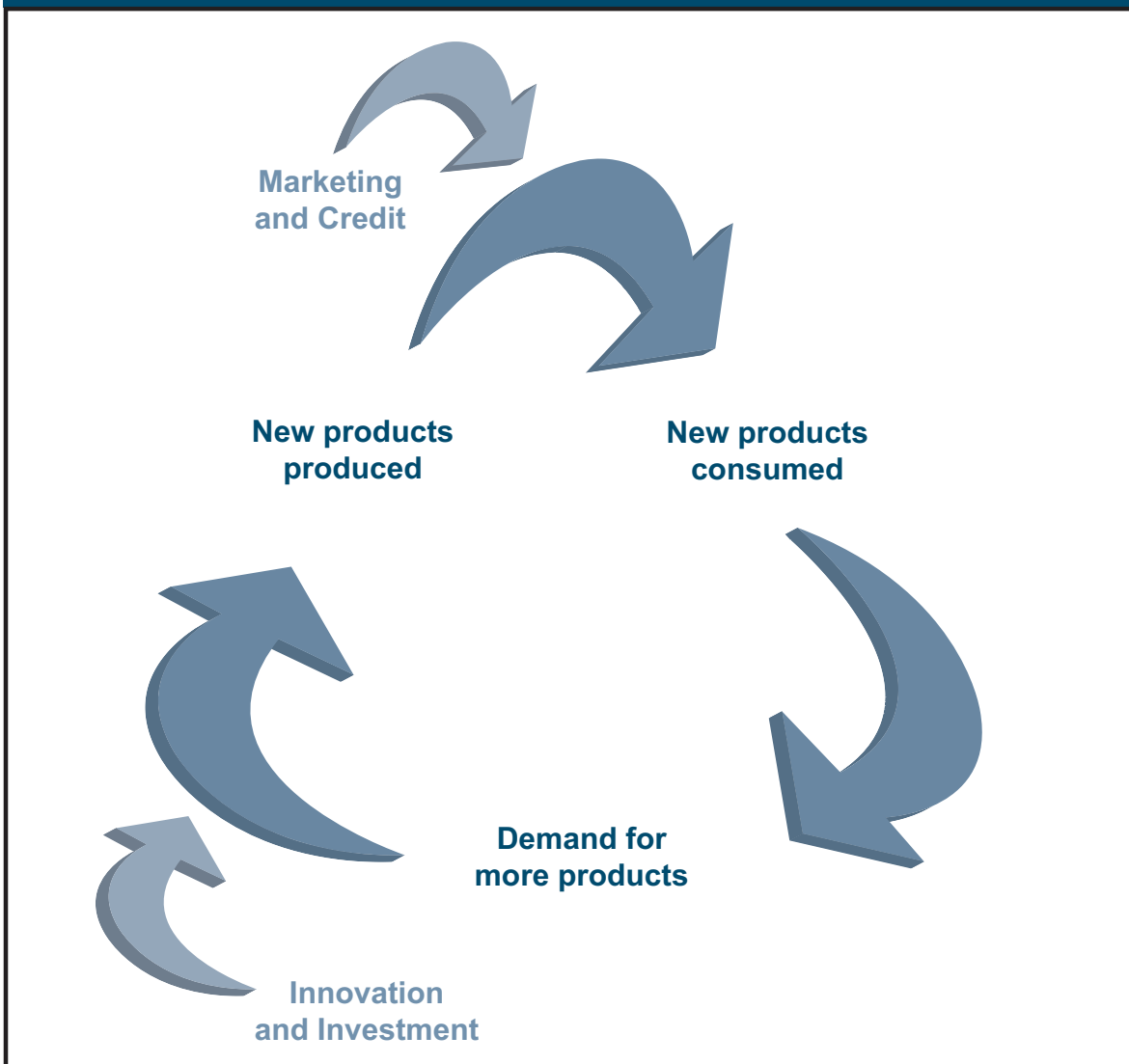
## Lesson Assessment

### Description

**Mass-produced Inventions Chart** (Student Workbook, pages 7–9) assesses students’ achievement of the learning objectives: “Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems” and “Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials).” To demonstrate what they have learned, students complete a chart and provide a written response to a question.

### Suggested Scoring

An Answer Key and Sample Answers for **Mass-produced Inventions Chart** are provided as part of Lesson 2 on pages 62–64. There are 29 total points possible in this part of the assessment.

**VA #8 Mass Production and Consumption Cycle**



1

**Camera Advertisement**  
Information Card



## *Bring Along a Brownie*

Making pictures—that's fun. Looking at them afterwards and showing them to your friends and family—that's still more fun, as you'll find from the first.

And it's all easy with a Brownie.

*Brownie Cameras, \$2.00 up*

Eastman Kodak Company, Rochester, N. Y., *The Kodak City*



**THE EFFICIENT MINUTE**

We have speeded up our ships and railways; we have made rapid transit more and more rapid; we have developed a mile a minute in the air and much faster in an automobile.

But the Bell Telephone is quickest of all. It is *instantaneous*. No weeks or days or minutes wasted in waiting for somebody to go and come; no waiting for an answer.

It is the most effective agency for making minutes more useful, more efficient.

In almost every field of work men are accomplishing more in less time with the Bell Telephone than they could without it. They can talk with more people, near and far; they can keep the run of more details; they can buy or sell more goods, and to better advantage; they can be active in more affairs.

The Bell Telephone has placed a new and higher value upon the minute—for everybody. It has done this by means of One Policy, One System, and Universal Service.

*Bell Long Distance Telephone service not only gives an added value to a man's minutes—it accomplishes business results which would be absolutely impossible without it. Every Bell Telephone is the Center of the System.*

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY  
AND ASSOCIATED COMPANIES**

*When writing to advertisers kindly mention Harper's Magazine.*



3

## Alarm Clock Advertisement

Information Card



**Y**OU'LL have to get up early to beat a Westclox alarm. It will get you up any time you say and keep good time all day.

Westclox is a short way of saying Western Clocks. The word, Westclox, is on the dial of every alarm we make. We put it there because we're proud of the quality we build into the clock.

Every Westclox alarm has the same good construction that made Big Ben and Baby Ben so popular.

Folks who become acquainted with Westclox quality look carefully for the word, Westclox, on the dial and tag. It is a mark of good timekeeping.

**Western Clock Co.— *makers of Westclox***  
La Salle & Peru, Illinois , U.S.A.







**SLICED PINEAPPLE**—Whole, unbroken slices of the finest sun-ripened fruit, from DEL MONTE's own plantations. Comes in four different sizes of cans—No. 2½ (30 oz.); No. 2 (20 oz.); No. 1½ Squat (14 oz.); and No. 1 Flat (9 oz.). One quality, the best, in every can.

**CRUSHED PINEAPPLE**—The same selected fruit as Sliced. Ideal for puddings, punches, ices, etc. Comes in No. 2½, No. 2, and No. 1 Flat tins; also in No. 1 Special (13 oz.) and Buffet (8 oz.) sizes.

Ask for  
**DEL MONTE**  
Coffee, too!  
Super-vacuum  
packed,  
uniformly fresh.



Ripened right on the tree—golden, luscious. A great dessert—at surprisingly little cost.



Five tempting DEL MONTE Fruits in a single can. Cut up, ready to serve.



Don't miss them. Just different enough from other fruits to get an instant welcome.



Bartlett's, of course—and what a treat! Flavor such as only the finest trees can produce.

## Is there any NEED for guessing?

... when this quality brand is so easy to get  
and so reasonable in price!

JUST think *how well*, and how many times DEL MONTE has met your most exacting needs. Think of the great food-producing organization behind it. Think of the millions of women who prefer this label to any other brand.

Think how important it is to us—to *continue* to hold your friendship!

You'll find it pretty hard to discover a single reason for experimenting with any brand that's offered "just as good"!

Especially when DEL MONTE Foods are so reasonable in price! And so easy to get—from any grocer who puts your interests first.

★  
*Del Monte Foods*  
FRUITS • VEGETABLES • COFFEE • ETC.





5

## Lightbulb Advertisement

### Information Card

# HOW SEE-ABILITY SPEEDS PRODUCTION



**RUBBER BOATS** made in this plant may save American lives. The operator must cut this rubber fabric accurately and fast. See-ability helps her do this vital job smoothly, exactly, at high speed. Better See-ability is made possible by the efficiency and brightness of today's Westinghouse Mazda Lamps. This See-ability enables the operator to work to closer limits, faster, more accurately. Under See-ability conditions, mistakes are fewer, accidents reduced, materials saved, inspection speeded. And See-ability is welcomed by

employees, too—for it lessens eyestrain and fatigue. When the big job of war production is done, these higher standards of lighting developed by Westinghouse engineers will be available to everyone—to factories and offices, to stores, hotels, theaters and restaurants, and to private homes. Let your local Westinghouse dealer tell you how bright, long-lasting Westinghouse Mazda Lamps will give you See-ability, or write Westinghouse Electric and Manufacturing Co., Bloomfield, New Jersey. *Plants in 25 cities . . . offices everywhere.*



*Listen to John Charles Thomas, NBC, Sunday, 2:30 P. M., E. W. T.*



**VA #9 Advertisement Guiding Questions**

- What is the item being advertised?
- What was its intended use or function?
- Who used this item in the 1920s?
- Who uses this item today? Has the intended use or function changed since the 1920s?
- What natural resources were used to produce this item?
- What was the effect on natural systems to make this item, use this item, and dispose of this item?
- Have the materials used to make this item changed since the 1920s? If so, what has changed and why? Do these changes alter the effects of this item on natural systems?



**Inventions Information Sheet**

Lesson 3 | page 1 of 3

During the 1920s, many inventions led to new products that changed the way people lived and worked. These products may have changed form, but all of them are still part of our lives today.

**Alarm Clock**

Instruments and methods for keeping time are some of the oldest of human inventions. A clock is a modern example of a tool that monitors or tracks time. In 1876, the Seth Thomas Clock Company



Alarm clock

received a patent for a new kind of clock, a small bedside alarm clock. Small alarm clocks became popular, and major U.S. clock companies started making them. Manufacturers improved the small clock construction, and by the 1920s, they mass-produced and marketed the clocks as an essential appliance for every home.

The clocks contained a complex system of metal gears, alarm bells, hands, mounting rings, and knobs. A glass lens enclosed the metal hands, which points to printed or painted numbers on a metal face. In the 1920s, clocks were wound using thin metal strands. Today's alarm clocks operate on batteries, electricity, or solar power.

**Camera**

Cameras allow people to take photographs of objects by working with light. Cameras generally consist of an enclosed hollow with an opening at one end for light to enter. Most cameras have a glass lens positioned in front of the camera's opening to gather the incoming light and focus all or part of the image on a recording surface at the other end of the camera.

The first small, portable camera for photography was built by Johann Zahn in 1685, but it would be almost 150 years before technology caught up to the point where this was practical. Early photographic cameras were similar to Zahn's model, but usually with the addition of sliding boxes for focusing. Before each exposure, the photographer had to insert a sensitized plate in front of the viewing screen to record the image.

In the 1920s, the box camera was popular. These box cameras were mass-produced with inexpensive glass optics and metal covered with leatherette. Leatherette is a kind of imitation leather made of paper, cloth, or plastic. The entire back of the camera opened to insert and remove the film, which was loaded onto a chrome rail and rolled onto a metal screw.



Camera

## Inventions Information Sheet

Lesson 3 | page 2 of 3

### Canned Food

Canning is a method of preserving food by processing it and sealing it into an airtight container, which is usually metal. The French military first developed this process as a way of protecting food from spoiling. As the canning process was mechanized, and urban populations grew throughout Europe, demand for canned food increased. Inventions brought improvements to the process. In 1812, the first U.S. canning factory in New York City used improved tin-plated wrought-iron cans for preserved oysters, meats, fruits, and vegetables. Demand for canned foods increased during wars and skyrocketed during World War I.

Today, tin-coated steel is the material most commonly used for canned foods.



Canned food

### Lightbulb

Considered to be one of the most life-changing inventions in human history, the electric lightbulb affects our everyday lives and makes many nighttime activities possible. While earlier experiments in electric lighting are documented, Thomas Alva Edison is credited with the development of the “incandescent lamp,” or lightbulb, in 1879. As electricity became more available in the early 1900s, the demand for and production of lightbulbs increased.

The incandescent lightbulb provides electric light through incandescence, or heat-driven light emissions.



Lightbulb

An electric current passes through a thin filament—a thread of metal, which is usually tungsten—heating it until it produces light. A glass globe encloses the filament and prevents the oxygen in air from reaching the hot filament, which would destroy it. Incandescent lightbulbs are made of glass, tungsten wire, small wires, and metal sleeves. Low-pressure inert gas, usually argon, neon, or nitrogen, fills the glass globe.

Due to the high energy usage of incandescent lightbulbs, more energy-efficient alternatives have been developed recently, for example, compact fluorescent lamps and LED lamps. Some governments have passed laws to phase out the use of incandescent lightbulbs. Brazil and Venezuela began to phase them out in 2005. Other nations have scheduled phase-outs: Ireland and Switzerland in 2009, Italy in 2011, Canada in 2012, and the United States between 2012 and 2014. As a result, efforts to improve the efficiency of incandescent lamps are being made. General Electric has announced work on “high efficiency incandescent” (HEI) lamps, which are expected to be four times as efficient as current incandescent lamps.

**Inventions Information Sheet**Lesson 3 | page 3 of 3

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**Telephone**

Alexander Graham Bell was credited with the invention of the telephone, although many other inventors claimed this invention as their own. Between 1844 and 1877, several versions of a device that transmits and receives sound were created, using various materials to transmit sound. In 1877, Thomas Edison received a patent for his carbon transmitter. He set up the first telephone system, called an exchange, in New Haven, Connecticut in 1878. In this exchange, people with telephones could communicate through operators working at a switchboard. In 1923, the first rotary dial telephone was developed in France.

As telephone systems and telephones for home use improved, they were mass-produced for



Telephone

consumers. Rotary dial telephones manufactured in the 1920s were made of wood or zinc alloy (changed to thermoplastic in 1941), carbon microphones, metal bells and parts, iron, wires, and magnets.



## Lesson 4



Cleared forest land, 1937

# Changing the American Landscape

**I**n this lesson, students explore the direct and indirect influences of mass production and mass consumption on the American landscape. Students view, discuss, and compare artworks from the 1920s and 2009 that portray mostly natural American landscapes.

Students then view a new graphic that combines the graphic organizers from Lessons 2 and 3, adding the component of byproducts and waste to the cycle of mass production and consumption. Students fill in the new graphic organizer while listening to a lecture that explores the relationship evolving between growing cities and natural systems due to the cycle of mass production, marketing, and

consumption. This prepares students to complete the graphic again in Lesson 5 for a specific product. To see the effects of consumption on the American landscape, students then compare one of the 1920s landscapes with a painting from 1940. Students then write about the direct or indirect influences brought to the American landscape through the changes of the 1920s.

### Background

At the beginning of the 1920s, Americans were making the transition from a wartime economy to a peacetime economy. Weapon building was no longer necessary, and soon manufacturing facilities—processes, facilities, workers, and innovations—refocused on serving U.S. consumers. New businesses and new jobs developed to accommodate



## Learning Objective

Describe the direct and indirect influences of growing cities on the American landscape and the associated natural systems.



new inventions, new means of production, and lifestyle changes. The middle class grew as the United States prospered. During this decade, our country became the richest nation on Earth, and consumerism was born.

Many people went to work and many earned good pay, usually about

five dollars per day. This, of course, depended on what you did and where you lived. For many Americans (not all), this was a time of relative prosperity. This allowed them to spend money on buying homes, taking vacations, and “living the good life” through music, movies, leisure reading, and shopping. Department stores developed. Their electric lighting and plate-glass windows enticed consumers with a wide variety of goods for sale. Consider Macy’s in Herald Square in New York City. Opened as a “bazaar” in 1878, Macy’s moved to its present site in 1902 and doubled in size in 1924. By the end of the 1920s, it had become the country’s largest department store.

The construction of homes, stores, and other buildings stimulated the economy with jobs for carpenters, electricians, and plumbers. The growth of cities and expansion of suburbs changed the physical landscape with new buildings and paved roads. With the new cars came jobs for car dealers, gas station attendants, mechanics, workers for roadside motels, and cooks for roadside

diners. More jobs brought increased income and spending.

Radios and film brought people together even more and helped develop a “national identity” forged around common experiences. Part of this identity promoted the introduction of time-saving appliances, such as washing machines, which eliminated the need to hand-wash clothes; refrigerators, which eliminated the need to go to the market daily; and vacuum cleaners, which were more efficient than brooms. However, use of such modern conveniences came at a price. Air pollution, water contamination, and waste accumulation became issues for modern society.



## Key Vocabulary

**American landscape:** The features of the land, cultural geography, and human social systems of the United States.

**Human social systems:** The functions, processes, and interactions among individuals, human communities, and societies including political, social, cultural, economic, and legal systems.

**Landscape:** The visible features of an area of land, or an image, depicting an expanse of scenery.

**Lifestyle:** A way of life or approach to living that reflects the attitudes and values of a person or group.

**Suburb:** A community on the outskirts of a city, that typically includes both residential and commercial areas.



Construction site, 1943

# Toolbox



## Summary of Activities

Students analyze and discuss scenes depicting American landscapes in the 1920s, learn about lifestyle changes based on mass production and consumption, and complete a graphic organizer about the relationships between the cycle of production and consumption and natural systems.



## Instructional Support

See Extensions & Unit Resources, pages 30–31.

### Prerequisite Knowledge



#### Students should know about:

- patterns of agricultural and industrial development as they relate to climate, use of natural resources, markets, and trade.
- the location and effects of urbanization, renewed immigration, and industrialization.

#### Students should be able to:

- identify natural systems.
- take notes on a lecture.

### Advanced Preparation



#### Gather and prepare Materials Needed.

#### Gather and prepare A-V Materials:

- Gather from previous lessons:
  - **Mass Production and Consumption Cycle**, Visual Aid #8

#### Read Lecture Notes:

- Prior to the lesson, read over the **Changing the American Landscape Lecture Notes** on pages 90–92.





## Materials Needed



### A-V Equipment:

- projection system, screen

### Class Supplies:

- pencils or pens

### Student Edition:

- A Clear Day, 1903, page 10
- Orange County Landscape, 2009, page 11
- Production and Consumption Flowchart, page 12

### Student Workbook:

- Mass Production, Marketing, and Consumption in the Roaring Twenties, pages 10–13

## Audio-Visual Materials



### Visual Aids:

- Production and Consumption, 1920s: Parts 1 and 2, Visual Aids #10–11

## Duration



### Preparation Time

15 min.

### Instructional Time

50 min.



## Safety Notes

None

# Procedures

## Vocabulary Development

Redistribute the students' individual **Student Workbooks** and use the **Key Unit Vocabulary** to introduce new words to students as appropriate.

### Step 1

Using the **Key Unit Vocabulary**, review the terms “American landscape,” “human social systems,” “landscape,” “lifestyle,” and “suburb” with students. Explain that in this lesson, students will consider both meanings of the term “American landscape,” and they will examine how that landscape changed because of mass production and mass consumption. Tell students they will first look at changes to the physical landscape of the United States during the 1920s. They will then consider how U.S. culture and human social systems changed during this same time.

### Step 2

Write “Natural Systems” and “Human Social Systems” on the board. Distribute a **Student Edition** to each student. Tell them to turn to **A Clear Day, 1903** (Student Edition, page 10). Explain that artist William Wendt painted this in the early twentieth century. Ask students, “What do you see in this landscape?” (*Fields, trees, grasses, mountains, hills, rocks, sky, clouds*) Have students decide into which category their response falls. Record students' responses on the board under either “Natural Systems” or “Human Social Systems.”

### Step 3

Tell students to turn to **Orange County Landscape, 2009** (Student Edition, page 11). Ask them to compare and contrast this image with Wendt's painting. Ask students, “What do you see in this landscape?” (*Trees, grasses, mountains, sky, clouds, a large housing development*) Have students decide into which category their response falls. Record students' responses on the board under either “Natural Systems” or “Human Social Systems.” Ask students the following questions:

- What would artists today depict as “the American landscape”? (*Skyscrapers, city lights, highways, the Grand Canyon, farms*)
- Would there be more concentration on human social systems or on natural systems? (*Accept any answer.*)

### Step 4

Tell students to turn to **Production and Consumption Flowchart** (Student Edition, page 12). Project **Production and Consumption, 1920s: Part 1** (Visual Aid #10) and tell students that the projected image shows the top half of the flowchart that they see on the page in the **Student Edition**. Review the parts of the flowchart together as a class.

**Project Production and Consumption, 1920s: Part 2** (Visual Aid #11) and tell students that the projected image shows the bottom half of the flowchart that they see on the page in the **Student Edition**. Review each part of the flowchart with students. Call their attention to the section called “Waste and Other Byproducts.” Ask students where these wastes and other byproducts are coming from. (*From the consumption of new products and from the processes being used to make the new products.*)

Point out to students that mass production and consumption would not have been possible without technology and natural resources. The availability of natural resources combined with new technologies keeps the cycle going.

### Step 5

Continue to project **Production and Consumption, 1920s: Part 2** while using **Changing the American Landscape Lecture Notes** (pages 90–92) to give students an overview of how mass production, mass consumption, and changes to lifestyles in the 1920s affected the American landscape. Instruct students to take notes on Part 1 of **Mass Production, Marketing, and Consumption in the Roaring Twenties** (Student Workbook, pages 10–13) during the lecture. (*Note: An Answer Key and Sample Answers for Mass Production, Marketing, and Consumption in the Roaring Twenties are provided on pages 94–97.*)



## Step 6

Instruct students to use the information in their notes to complete Part 2 of **Mass Production, Marketing, and Consumption in the Roaring Twenties** for homework.

Gather **Student Editions**.

Collect **Student Workbooks** and use **Mass Production, Marketing, and Consumption in the Roaring Twenties** for assessment.



## Changing the American Landscape Lecture Notes

### I. Dramatic Changes in the 1920s

The 1920s were a period of dramatic changes. World War I had recently ended, and the Industrial Revolution had introduced many new inventions. The nickname “the Roaring Twenties” conveys the excitement over these economic and social changes.

- a. More than half of all Americans now lived in cities.
- b. The growing affordability of the automobile made people more mobile than ever.
- c. The flexibility of the car allowed for the growth of suburbs, which expanded cities throughout the nation.
- d. The demand for cars and trucks led to the construction of roads.
- e. As roads turned into highways, and highways connected cities across the continent, people wanted convenient roadside filling stations, tourist cabins, and restaurants.

### II. Economic Boom

As parts of the economy boomed (for example, real estate, finance, “high tech”), wages rose for most Americans and prices fell, resulting in a higher standard of living and a great increase in consumer consumption.

- a. Advertisements promoted “labor-saving” home appliances to American women.
- b. The new mass media, which included radio and motion pictures, encouraged women to change the ways they dressed, worked, and lived. Some say that pursuing the societal changes they observed in the mass media consumed the time saved by “labor-saving” home devices.
- c. Many new appliances required electricity, and so electric utility networks began to increase, as well. The more electricity used for lighting, heating, cooking, and other household needs, the greater the need for generating and supplying electricity to American homes.

### III. Automobile Industry Leads Growth of American Economy

The automobile industry led the growth of the American economy during the 1920s.

- a. The number of cars on the road almost tripled between 1920 and 1929, stimulating the production of steel, rubber, plate glass, and other materials that went into making an automobile.
- b. Mass production and standardization produced cars more quickly and efficiently, which had a dramatic impact on price. The Model T that sold for \$850 in 1908 sold for \$290 in 1924.
- c. Ford created new management techniques designed to build worker loyalty and stunt the development of unions. Ford paid the highest wages in the industry and established the 5-day, 40-hour workweek.
- d. Some other companies (not all) followed suit, improving working conditions, offering health insurance and profit-sharing plans, and developing recreational programs. These strategies worked, and workers had job stability, a steady income, and more leisure time than ever before.
- e. More Americans could settle into homes, purchase luxury goods, and spend money on leisure activities, such as movies, sports, and vacations.

### IV. Encouraging Mass Consumption

U.S. industries produced thousands of consumer goods in the 1920s, everything from washing machines to electric razors.

- a. Advertising and credit encouraged mass consumption. Advertising created a demand for products, and installment buying, or credit, which enabled people to purchase products even if they did not have the cash saved for them.
- b. During World War I, the media used advertising to shape public feelings and support for the war efforts.
- c. After the war, ad agencies used newspapers, magazines, and radio to influence what people bought.



## Changing the American Landscape Lecture Notes (continued)

### IV. Encouraging Mass Consumption (continued)

- d. Ads persuaded consumers to buy goods by creating the illusion that love, youth, power, or attraction was available to anyone who bought a certain brand of toothpaste, perfume, or cooking stove.
- e. Department stores developed, providing an easy way to shop. Their electric lighting and plate-glass windows displayed a wide variety of goods for sale, encouraging people to buy.
- f. The opportunity to buy on credit was also a powerful marketing tool. Businesses enticed consumers to pay a small amount as a down payment and pay off the balance in monthly installments, instead of saving money for an item and purchasing it with cash.
- g. As a result, Americans bought many luxury goods. Manufacturing these items required increased amounts of natural resources, more electrical energy to operate these items, and larger dumps to dispose of old items. The number of factories increased.

### V. Direct Effects on Natural Systems

The progress of manufacturing and consumption in the 1920s changed the American landscape, which affected natural systems both directly and indirectly. Direct effects resulted from the extraction of natural resources and the construction of buildings, roads, and factories.

- a. As cities and suburbs grew, an increase in building created a demand for more lumber.
- b. Manufacturers increased the use of nonrenewable natural resources to increase production of goods and operate their factories.
- c. During this decade, manufacturers shifted their energy sources from coal and water to oil and natural gas.
- d. In 1900, steam provided 80% of the power in manufacturing. By 1920, electricity provided 50%, and by 1929, electricity drove 78% of all manufacturing.

### V. Direct Effects on Natural Systems (continued)

- e. The shift from coal and waterpower as energy to the use of oil and natural gas helped to increase the rate of productivity in factories.
- f. The demand for petroleum led to oil discoveries in Santa Fe Springs, California in 1921, as well as Powell, Texas, and Smackover, Arkansas. The supply increased in 1926 and 1928 with new strikes in Oklahoma and Texas.

### VI. Indirect Effects on Natural Systems

Indirect effects included the byproducts produced by manufacturing, the disposal of byproducts and used goods, and dependence on machines that required petroleum-based or electrical energy sources.

- a. Advances in production required less labor and soon drove down the costs of items. For example, advances in the quality and manufacturing of car tires between 1910 and 1930 drove down the tire costs per thousand miles of driving from \$9.39 to \$.065.
- b. Chemical, paper, glass, and food manufacturers all developed rapidly during the 1920s due to technological advances.
- c. Mechanization, improved by fuel sources, decreased labor needs and increased productivity.
  - i. Coal mining increased when companies began to use mechanical loading devices.
  - ii. Electric cranes could lift heavier loads for faster construction of large buildings, including new department stores.
  - iii. Machines that mixed materials and smoothed the surface of cement highways made paving roads easier.
- d. As prices fell and sales increased, manufacturing increased, generating more byproducts.
  - i. Byproducts and used household products required disposal in larger and larger amounts.

Changing the American Landscape Lecture Notes (continued)

<p><b>VI. Indirect Effects on Natural Systems (continued)</b></p> <ul style="list-style-type: none"><li>ii. Mining and manufacturing released toxins into the air and water.</li><li>iii. Soap and chemicals from washing machines polluted rivers.</li><li>iv. Household wastes increased due to increased packaging and the discarding of used household goods.</li></ul>	<p><b>VI. Indirect Effects on Natural Systems (continued)</b></p> <ul style="list-style-type: none"><li>e. In the 1920s, a land disposal technology developed that was a precursor to modern sanitary landfills. It combined filling and open dumping, but also required a “sanitary” covering of the waste with soil, and sometimes spraying of the surface, to eliminate the problem of rotting organic materials. The modern sanitary landfill developed between the end of World War II and the 1980s.</li></ul>
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## Lesson Assessment

### Description

**Mass Production, Marketing, and Consumption in the Roaring Twenties** (Student Workbook, pages 10–13) assesses students' achievement of the learning objective: "Describe the direct and indirect influences of growing cities on the American landscape and the associated natural systems." To demonstrate what they have learned, students write an essay in response to a prompt.

### Suggested Scoring

Use the **Mass Production, Marketing, and Consumption in the Roaring Twenties Scoring Tool** for Part 2 provided on page 96 and the sample provided on pages 94–97 to assess students' work. There are 12 total points possible.

## Answer Key and Sample Answers

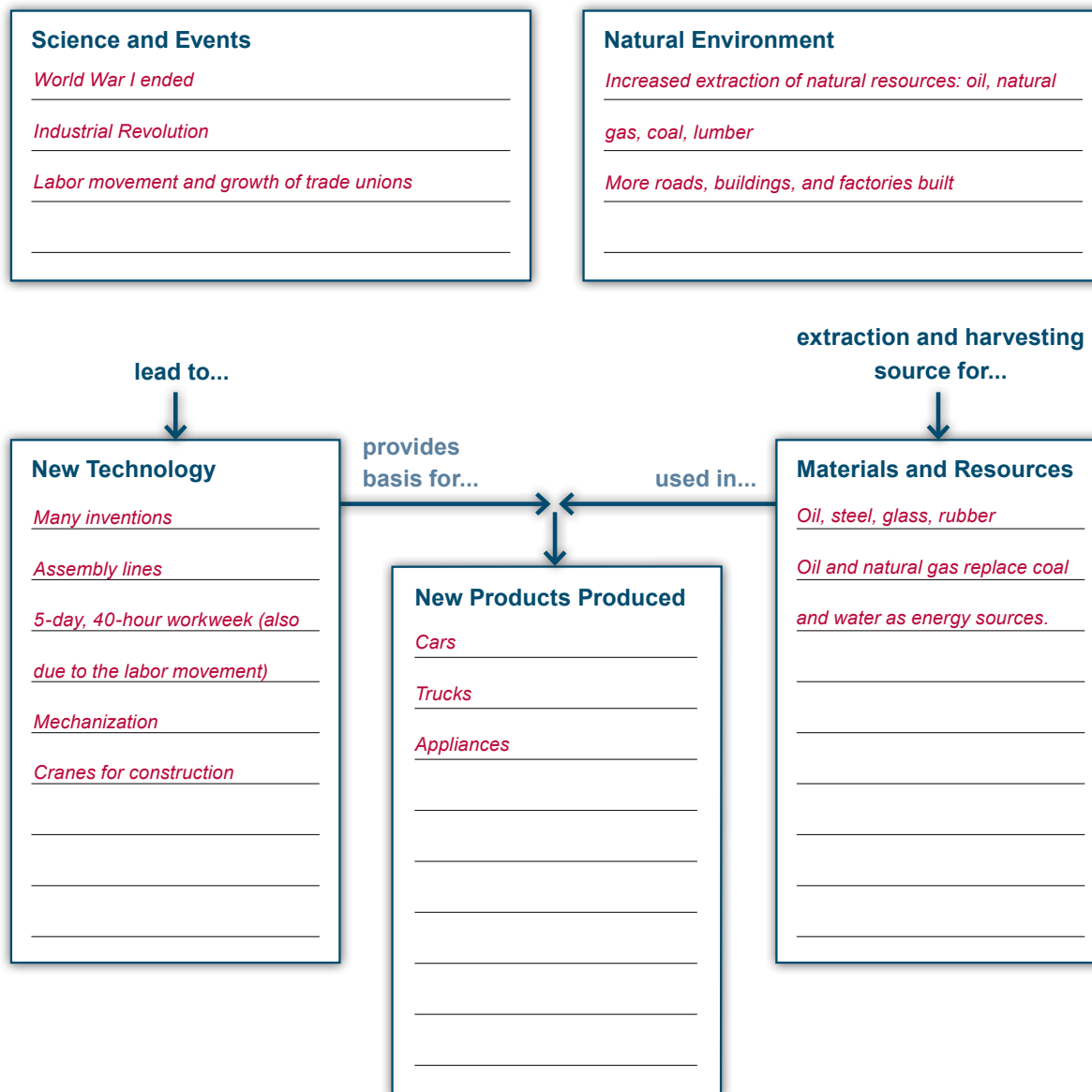
### Mass Production, Marketing, and Consumption in the Roaring Twenties

Lesson 4 | page 1 of 4

Name: \_\_\_\_\_

#### Part 1

**Instructions:** Use the information in this lesson to fill in the spaces on the flowchart below and on page 2. You may use information from the **Rise of Mass Production and Mass Consumption** (on pages 5–6) to help you.

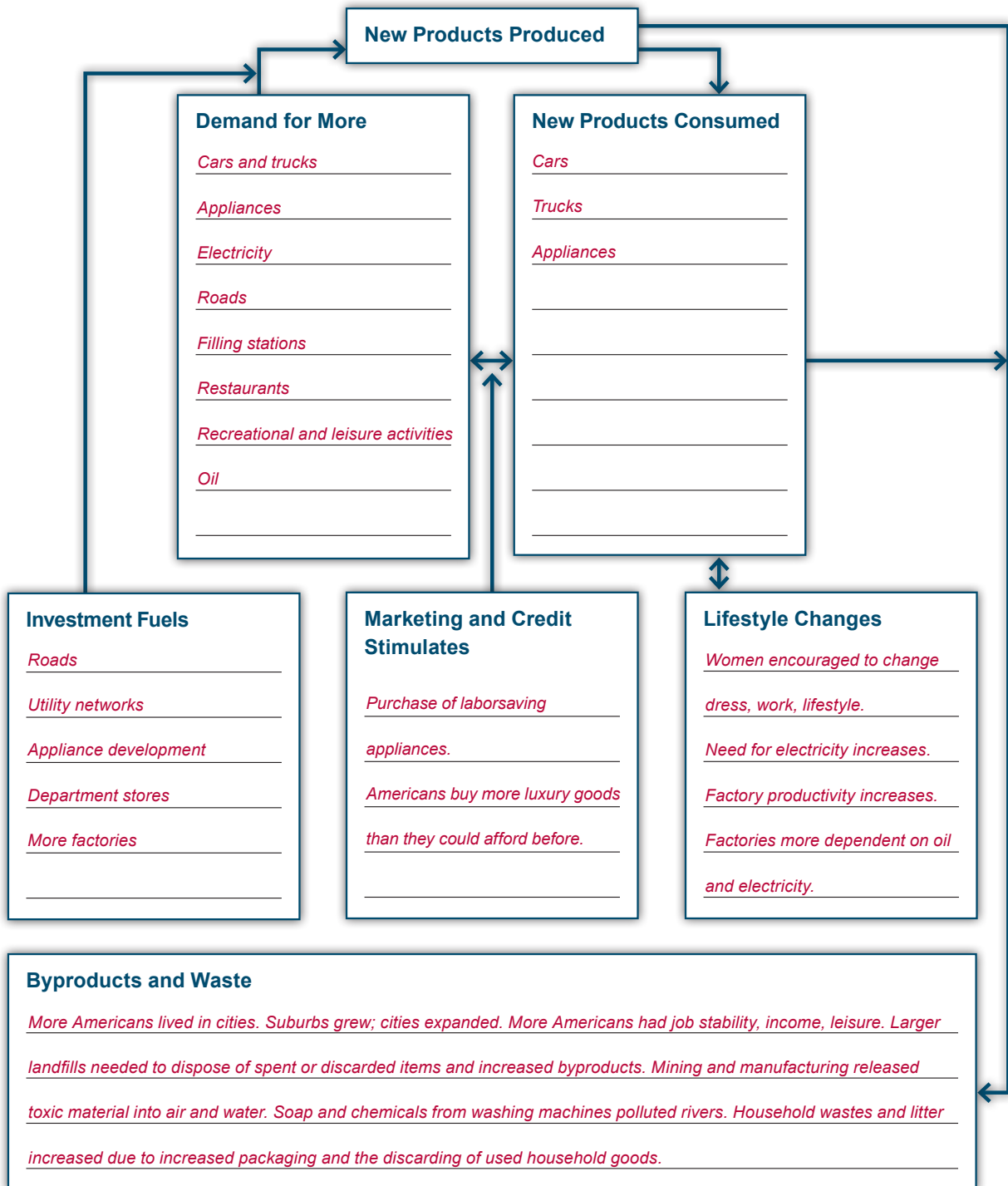


## Answer Key and Sample Answers

## Mass Production, Marketing, and Consumption in the Roaring Twenties

Lesson 4 | page 2 of 4

Name: \_\_\_\_\_





## Answer Key and Sample Answers

### Mass Production, Marketing, and Consumption in the Roaring Twenties

Lesson 4 | page 3 of 4

Name: \_\_\_\_\_

#### Part 2

**Instructions:** Write a brief essay (2–3 paragraphs) describing the direct and indirect influences of the changes taking place in the 1920s on the American landscape. Include the following in your essay:

- A description of the American landscape before 1920.
- Descriptions of the growing cities and human social systems that developed in the 1920s.
- Explanations of the influences of growing cities and human social systems on natural systems.

The following Scoring Tool will be used to score your essay:

#### Mass Production, Marketing, and Consumption in the Roaring Twenties Scoring Tool

Element	4 points	3 points	2 points	1 point
<b>Describes features from natural systems</b>	Thoroughly describes five or more features from natural systems.	Describes three or four features from natural systems.	Describes two features from natural systems.	Identifies one feature from natural systems.
<b>Describes features of growing cities and human social systems</b>	Thoroughly describes five or more influences and features of other human social systems that developed in the 1920s.	Describes three or four influences and features of cities or other human social systems that developed in the 1920s.	Describes one or two influences and features of cities or other human social systems that developed in the 1920s.	Mentions one feature of a city or other human social system that developed in the 1920s.
<b>Explains the influences of growing cities and human social systems on natural systems</b>	Thoroughly explains how growing cities and human social systems directly and indirectly influenced the American landscape and natural systems.	Explains some aspects of how growing cities and changing human social systems directly and indirectly influenced the American landscape and natural systems.	Describes several aspects of how growing cities and changing human social systems directly and indirectly influenced the American landscape and natural systems.	Mentions how growing cities and changing human social systems directly and indirectly influenced the American landscape and natural systems.

## Answer Key and Sample Answers

**Mass Production, Marketing, and Consumption in the Roaring Twenties**

Lesson 4 | page 4 of 4

Name: \_\_\_\_\_

*Social, economic, and physical changes occurred during the 1920s that directly and indirectly influenced the American landscape and natural systems. Events, such as World War I and the Industrial Revolution, together with the availability of natural resources, led to the development of many new inventions. These inventions made the lives of Americans easier. For example, the automobile made transportation easier, and vacuums made cleaning homes easier. However, the inventions of the 1920s also changed the social and physical landscape across America.*

*Before 1920, the American landscape consisted mostly of forests, mountains, rivers, fields, and plains. Farmers used much of the land for agriculture, and cities were located mostly along the coasts and rivers. Land seemed plentiful. Some dirt roads connected cities and farms, but they were not prominent features of the landscape.*

*During and after the 1920s, the American landscape began to change. People built highways, gas stations, motels, and diners to serve travelers using the many new cars. The number of factories increased in order to produce more goods, and department stores were established to sell the many new products. More jobs were available, and people had more money to spend on goods and homes.*

*Mass consumption changed the landscape in America as people worked more, consumed more, and advertised more. Advertising encouraged Americans to look better, smell better, and have better lives by using certain products. Human social systems began to dominate the American landscape where natural systems once did. In addition, the mining, logging, and extraction of natural resources for building and producing goods directly affected natural systems. Consumption indirectly affected natural systems by contributing to air and water pollution, creating the need for bigger dumps, and causing other changes to the land.*

## A Clear Day, 1903

### Lesson 4

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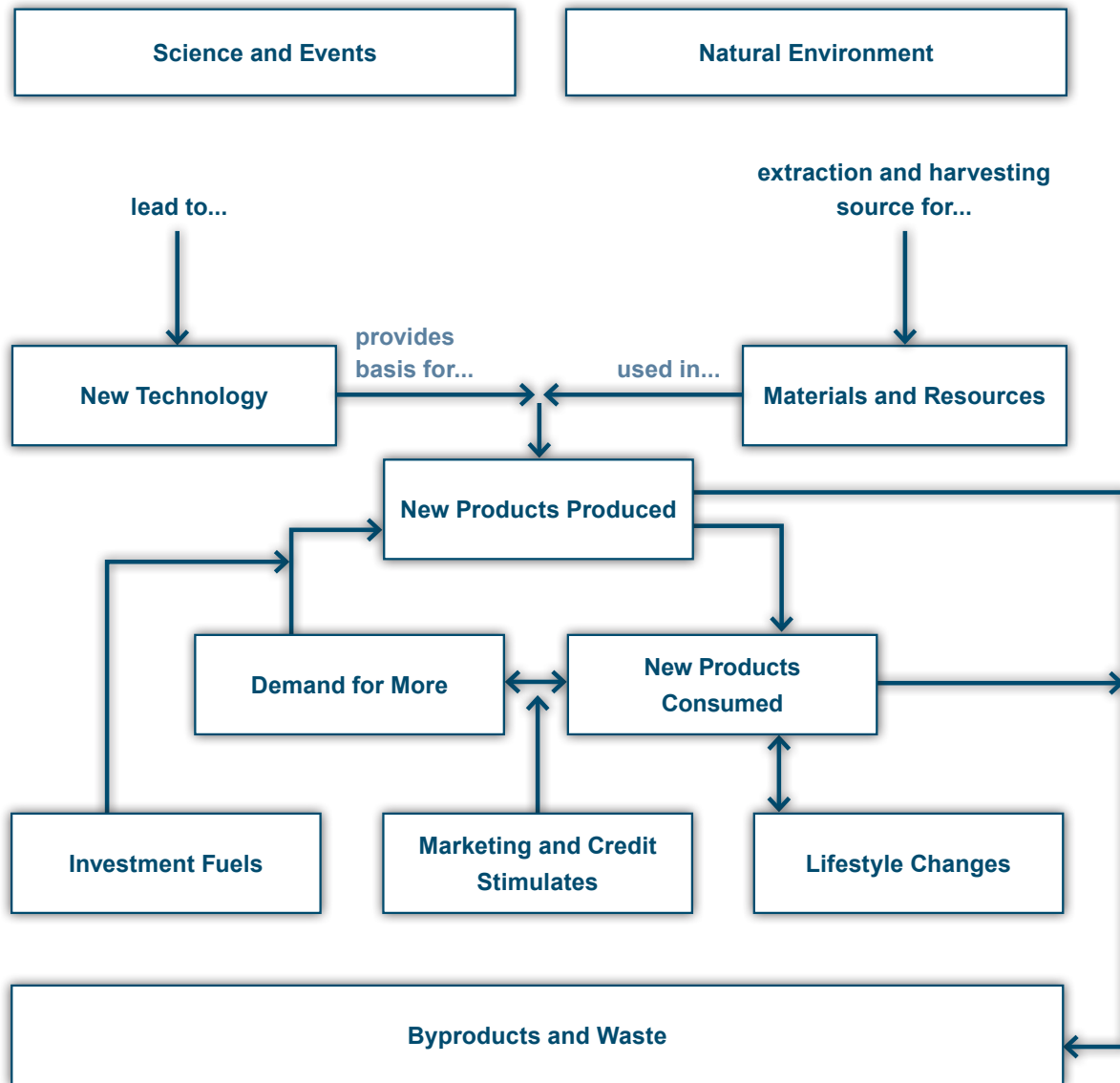


**Orange County Landscape, 2009**Lesson 4

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## Lesson 4

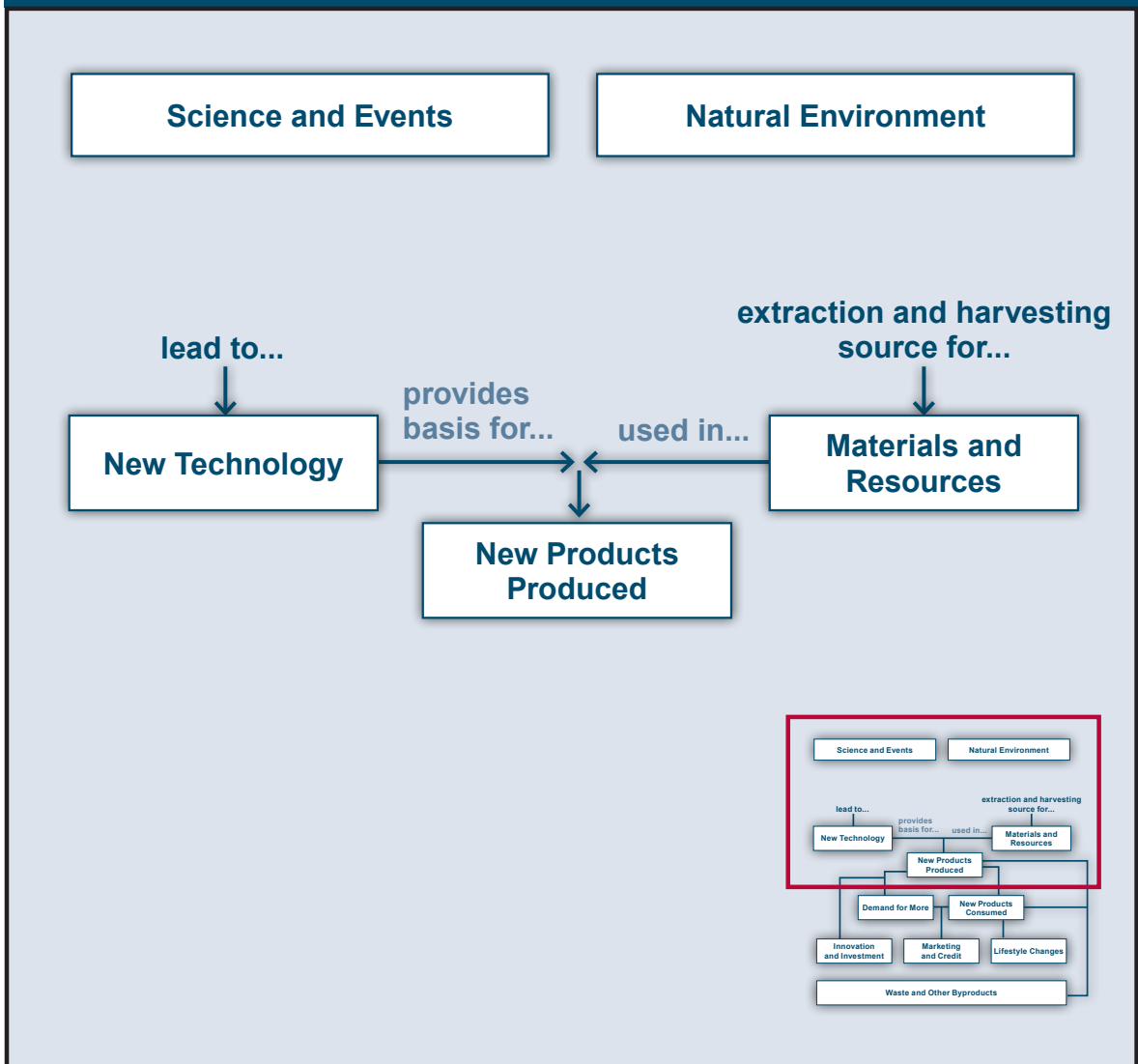


10

## Production and Consumption, 1920s: Part 1

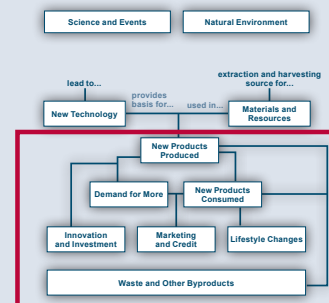
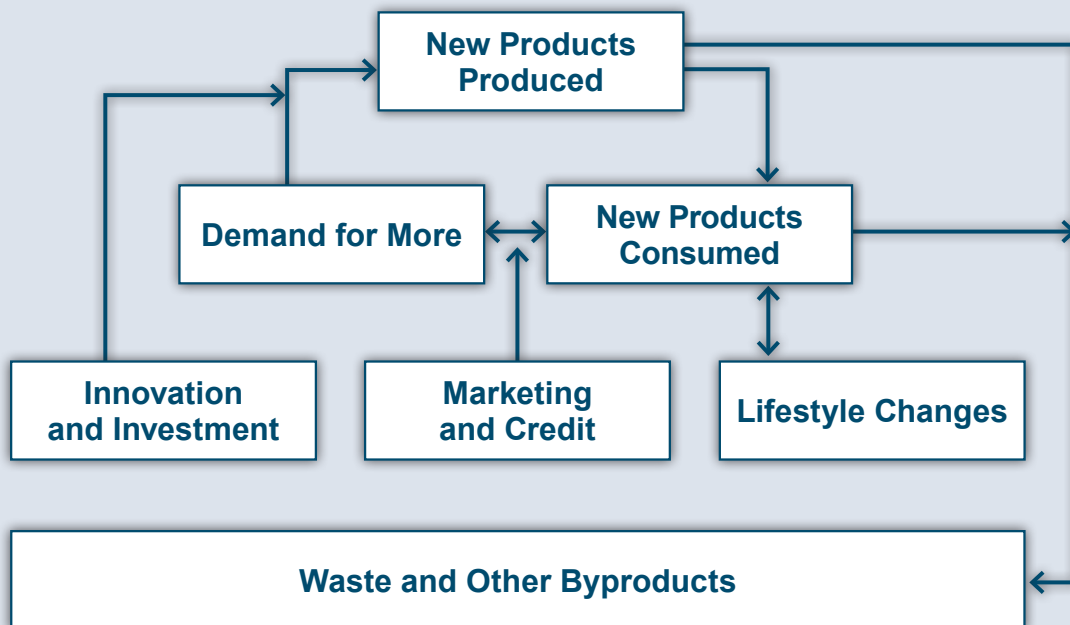
Visual Aid

## VA #10 Production and Consumption, 1920s: Part 1





## VA #11 Production and Consumption, 1920s: Part 2









## Lesson 5



Swing made from used tire

# Consequences of Consumption

In this lesson, students continue to explore the relationships among science and technology, natural systems, mass production, and mass consumption. They examine the byproducts of these relationships and their effects on natural systems by reviewing information presented in *California Connections: California's Waste Tire Problem*.

To reinforce their understanding of the cycle of mass production and consumption and its effects on natural systems, students brainstorm a list of familiar goods that fit into the cycle. The class then focuses on one ubiquitous mass-produced product—the plastic shopping bag. While listening to a lecture about the development and use of plastic bags, students make notes on a blank copy of the graphic organizer presented in the previous lesson. Working in small groups,

students discuss questions related to the effects of plastic bags on natural systems and propose possible alternatives. Students then write responses to these questions, describing the effects that changes may have on the cycle of mass production and consumption.

### Background

Hair dryers, adhesive bandages, toasters, and radios... the 1920s ushered in an era of mass production of goods designed to meet the needs

and wants of the growing middle class in the United States. With mass production came mass consumption and the development of a cycle that laid a foundation for a society of consumerism. Henry Ford made the automobile affordable through mass production and attractive to consumers through marketing, and other car manufacturers followed suit. Ever since, the world has consumed great numbers of cars. One result of this mass consumption



## Learning Objectives

Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems.

Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials).



Agency (U.S. EPA) indicate that about 12% of plastic bags and film are recycled each year. Today, almost 90 percent of floating marine debris is plastic. Due to its durability, buoyancy, and ability to absorb and concentrate toxins present in the ocean, plastic is especially harmful to marine life.

Returning to paper bags is expensive, both financially and environmentally. Producing paper consumes natural resources, generates harmful byproducts, and requires more fossil fuels to produce and transport than plastics. To produce one plastic bag costs about two cents, while paper bags cost about four cents. Alternatives, called bioplastic bags, can be made from natural starches (for example, corn, potato, or cassava) or vegetable oils at a cost of seven or eight cents per bag. In addition to bioplastic bags, there are also bags designed for multiple uses. Reusable bags can be made of recycled plastic, fiber, or other natural or human-made materials. They range in cost, depending on the material type used. It has been estimated that one reusable bag for an average person can replace up to 500 individual uses of plastic bags.

has been the byproduct of worn tires tossed into dumps and, more recently, recycling efforts to retread and reuse old tires. What about the thousands of other mass-produced products that have affected natural systems through natural resource extraction and waste disposal?

A common and controversial product is the plastic shopping bag, usually made from polyethylene. Polyethylene is a thermoplastic, a byproduct of petroleum or natural

gas that melts to liquid when heated. Different processes can produce different densities of polyethylene. Although polyethylene can be recycled, most plastic bags end up as urban blight or in landfills, waterways, and in the ocean. They are not considered biodegradable because they take centuries to degrade, if ever. Americans discard an estimated 100 billion polyethylene plastic bags each year. Data from the United States Environmental Protection



Jellyfish and plastic bags

## Key Vocabulary

**Biodegradable:** Objects, materials, and chemicals that can be decomposed by bacteria and fungi.

**Plastic:** Any of various organic materials produced by polymerization that are capable of being molded, extruded, cast into various shapes and films, or drawn into filaments to be used as textile fibers.

# Toolbox



## Summary of Activities

Students review *California Connections: California's Waste Tire Problem* and brainstorm mass-produced goods in use today. After completing a chart, applying the cycle of mass production and consumption to plastic bags, they discuss and write about the effects of plastic bags on natural systems.



## Instructional Support

See Extensions & Unit Resources, pages 30–31.

### Prerequisite Knowledge



#### Students should know about:

- transformations of the U.S. economy and the changing social and political conditions in the United States in response to the Industrial Revolution.
- the connections among natural resources, entrepreneurship, labor, and capital in an industrial economy.

#### Students should be able to:

- interpret charts and graphic organizers.
- take notes on a lecture.
- summarize ideas in writing.

### Advanced Preparation

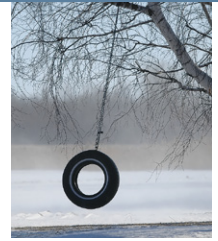


#### Gather and prepare Materials Needed.

#### Gather and prepare A-V Materials.

#### Read Lecture Notes:

- Prior to the lesson, read over the **Plastic Bags Lecture Notes** on pages 110–111.



## Materials Needed



### A-V Equipment:

- projection system, screen

### Class Supplies:

- colored markers
- pencils or pens

### Student Workbook:

- Mass Production, Marketing, and Consumption of Plastic Shopping Bags, pages 14–17

## Audio-Visual Materials



### Visual Aids:

- “White Pollution” in Beijing, Visual Aid #12
- Plastic Bag or Jellyfish?, Visual Aid #13
- Pacific Garbage Patch, Visual Aid #14
- “White Pollution” in the Marine Environment, Visual Aid #15
- Mass Production, Marketing, and Consumption: Parts 1 and 2, Visual Aids #16–17

## Duration



### Preparation Time

10 min.

### Instructional Time

50 min.



## Safety Notes

None



# Procedures

## Vocabulary Development

Redistribute the students' individual **Student Workbooks** and use the **Key Unit Vocabulary** to introduce new words to students as appropriate.

### Step 1

Tell students to turn to **Production and Consumption Flowchart** (Student Edition, page 12). Review the flowchart with students and answer any questions. Remind students that as long as technology and natural resources supply this cycle, it will continue to generate more products, more byproducts, more waste, and more consumption.

### Step 2

Remind students of **California Connections: California's Waste Tire Problem** (Student Edition, pages 2–5), which they read in Lesson 1, and ask them the following questions:

- Where do car tires fit in the cycle of mass production, marketing, and consumption? (*Cars were invented; the assembly line increased production; natural resources, such as rubber and petroleum, were extracted from natural systems; tires were made from natural resource-based materials; cars were mass-produced and costs decreased; consumers purchased more cars; tires on cars wore out; old tires were discarded; demand for tires increased; manufacturers made more tires; investment and science found ways to make better tires; people continued to purchase cars and tires; the cycle continued.*)
- How are government and business addressing the problem of discarded car tires? (*The California Integrated Waste Management Board [CIWMB] provides incentives for finding new ways to recycle or reuse tires; government oversees tire dump sites; government cleans up old dump sites; businesses find ways to reuse old tires, such as retreading them or using shredded tire rubber for playgrounds, constructing buildings, and roads.*)

### Step 3

Ask students to think of products they use today that fit into the mass production, marketing, and consumption cycle. Divide students into pairs or small groups, and instruct them to brainstorm and list as many items as they can think of that fit into this cycle. (*Answers will vary. The list may include: plastic water bottles, soda cans, polystyrene containers, paper napkins, shopping bags, books, magazines, MP3 players, compact disks, computers, DVDs, writing paper, shoes, T-shirts, toothpaste, hair products, liquid soap*) Have students share their lists with the class. Ask if anyone put plastic shopping bags on their list.

### Step 4

Ask students to share what they know about plastic shopping bags. (*Used in most grocery stores; provide option to paper bags; may be reused or recycled; if not recycled or disposed of properly, can affect the environment.*)

Explain that the development and use of plastic became popular after World War I when petroleum became more readily available and more frequently used in manufacturing. Today, businesses, governments, and citizens around the world debate the costs and benefits of plastic shopping bags. Like car tires that have filled dump sites, plastic shopping bags, if not recycled or disposed of properly, can become harmful. They cause damage on land, in the ocean, and in landfills.



## Step 5

Tell students to turn to **Mass Production, Marketing, and Consumption of Plastic Shopping Bags** (Student Workbook, pages 14–17). Instruct students to take notes on Part 1 while listening to a lecture on the subject. Encourage students to use the flowchart on **Mass Production, Marketing, and Consumption in the Roaring Twenties** to help them. (*Note: An Answer Key and Sample Answers for Mass Production, Marketing, and Consumption of Plastic Shopping Bags are provided on pages 115–118.*)

## Step 6

Using the **Plastic Bags Lecture Notes** (provided on pages 110–111), give students an overview of how mass production, mass consumption, and changes to our modern lifestyles contributed to the development and use of plastic bags, and how plastic bags have affected the American landscape. Project **“White Pollution” in Beijing, Plastic Bag or Jellyfish?, Pacific Garbage Patch, and “White Pollution” in the Marine Environment** (Visual Aids #12–15), at the appropriate points in the lecture.

When the lecture is complete, project **Mass Production, Marketing, and Consumption: Part 1** (Visual Aid #16) and fill it in with help from the students. Continue with **Mass Production, Marketing, and Consumption: Part 2** (Visual Aid #17). (*Note: An Answer Key and Sample Answers for Mass Production, Marketing, and Consumption: Parts 1 and 2 are provided on pages 112–113.*)

## Step 7

Organize students into pairs and have them discuss the questions in Part 2 of **Mass Production, Marketing, and Consumption of Plastic Shopping Bags**. Instruct students to individually write their answers on **Mass Production, Marketing, and Consumption of Plastic Shopping Bags**. When students have finished answering the questions, if time permits, have them share their responses.

Collect **Student Workbooks** and use **Mass Production, Marketing, and Consumption of Plastic Shopping Bags** for assessment.

## Plastic Bags Lecture Notes

### I. Plastic is Introduced

Alexander Parkes introduced plastic in 1862. In 1909, Leo H. Baekeland coined the word “plastic” to describe a new class of materials that included “bakelite,” a substance he created from coal tar. (Coal tar is a byproduct produced when coal is carbonized to make coke or gasified to make coal gas).

- a. Bakelite was used to produce many items, including telephones, cameras, and even ashtrays.
- b. Plastic did not become popular until after World War I, when petroleum became readily available. Petroleum can be more easily processed than coal.
- c. Petroleum and natural gas are the primary sources of the key ingredients in plastic.
- d. Plastics are composed of polymers, which are large molecules made of repeating units called monomers. In plastic bags, the repeating units are ethylene, or ethene. Plastic shopping bags are made from low-density polyethylene (LDPE). Some lubricant and sometimes color pigments are added to make plastic bags.
- e. To make bags, oil is pumped from the ground, transported to a refinery, and converted into pellets, often called “nurdles.” A component of oil, called polyethylene, is heated and used to form the plastic from which bags are cut. All these steps require energy.

### II. Plastic Shopping Bags

Polyethylene was first used to make plastic shopping bags in 1977, but it was not until 1982 that people started relying on plastic shopping bags for their groceries and other purchases.

- a. Large grocery companies started replacing paper bags with more convenient and affordable plastic bags.
- b. Plastic bags require 70% less energy to make than paper bags, take less energy to recycle, and take up less space in landfills than paper bags.

### II. Plastic Shopping Bags (continued)

- c. Many people reuse plastic shopping bags for trash disposal, lunch bags, and pet pick-up.
- d. Five hundred billion to 1 trillion plastic bags are used worldwide every year.
- e. Businesses have come to rely on plastic bags to support consumer buying.
  - i. Free bags to help consumers carry away all their purchases.
  - ii. Some businesses developed their own bags for marketing and advertisement.
- f. Consumers have come to depend on plastic shopping bags for convenience and to support current lifestyles.

### III. Problems with Plastic Shopping Bags

Plastic shopping bags, if not recycled or disposed of properly, can become litter on land and in the ocean.

*Project “White Pollution” in Beijing (Visual Aid #12).*

- a. In China, plastic bags blowing around the streets are called “white pollution.”

*Project Plastic Bag or Jellyfish? (Visual Aid #13).*

- b. People in South Africa used to joke that the plastic bag was their “national flower” before banning plastic bags in 2003.
- c. Sea turtles, birds, whales, and other marine animals have eaten bags floating in the water. The bags mimic jellyfish, a natural food from the sea. Ingestion usually causes death.

*Project Pacific Garbage Patch (Visual Aid #14).*

- d. The North Pacific Gyre is home to the world’s largest floating island of trash that is estimated to be more than 5 million square miles—larger than the entire United States. A study conducted by Algalita Marine Research Foundation in the North Pacific Gyre found six more times the mass of plastic particles than plankton.





## Plastic Bags Lecture Notes (continued)

### III. Problems with Plastic Shopping Bags (continued)

Project “*White Pollution*” in the Marine Environment (Visual Aid #15).

- e. This “garbage patch” has formed in an area of the ocean where the currents circle. It contains large amounts of suspended plastic and other debris trapped by the ocean currents.
- f. The polymer pieces in plastic bags are not biodegradable. The bag may break into pieces, but the pieces still exist as plastic.
- g. Studies of the seafloor in the northwestern Mediterranean found that plastics made up 77% of the debris on the seafloor. Of this debris, 93% was plastic bags.
- h. Citing environmental reasons, several countries have banned or discouraged the use of plastic shopping bags, including Australia, China, Bangladesh, South Africa, Rwanda, Italy, Ireland, Mumbai, and India.
- i. In 2007, the city of San Francisco banned the use of plastic shopping bags in large supermarkets and retail pharmacy chains. This law has eliminated the use of an estimated five million plastic bags each month. Currently, other cities, counties, and states are considering a ban on plastic shopping bags.

### IV. Advantages of Plastic Shopping Bags

- a. Plastic grocery bags require 70% less energy to manufacture than paper bags.
- b. Lightweight plastic bags cost less to transport. Seven trucks are needed to deliver the same number of paper bags as the number of plastic bags that one truck can deliver.
- c. Plastic bags can be reused, for example, to line household wastebaskets.
- d. Recycled plastic bags can be made into a variety of second generation products, such as new bags and plastic lumber for decking.

## VA #16 Mass Production, Marketing, and Consumption: Part 1

### Science and Events

*Plastic developed.*

*Convenience and cost of paper bags high.*

### Natural Environment

*Oil and natural gas taken from ground.*

*Oil transported overland by road, pipeline, or by water on  
tanker ships.*

lead to...



### New Technology

*Plastic bags designed; more  
convenient, less cost to  
manufacture; less landfill  
space needed.*

provides  
basis for...

used in...



### New Products Produced

*Plastic shopping bags.*

extraction and harvesting  
source for...

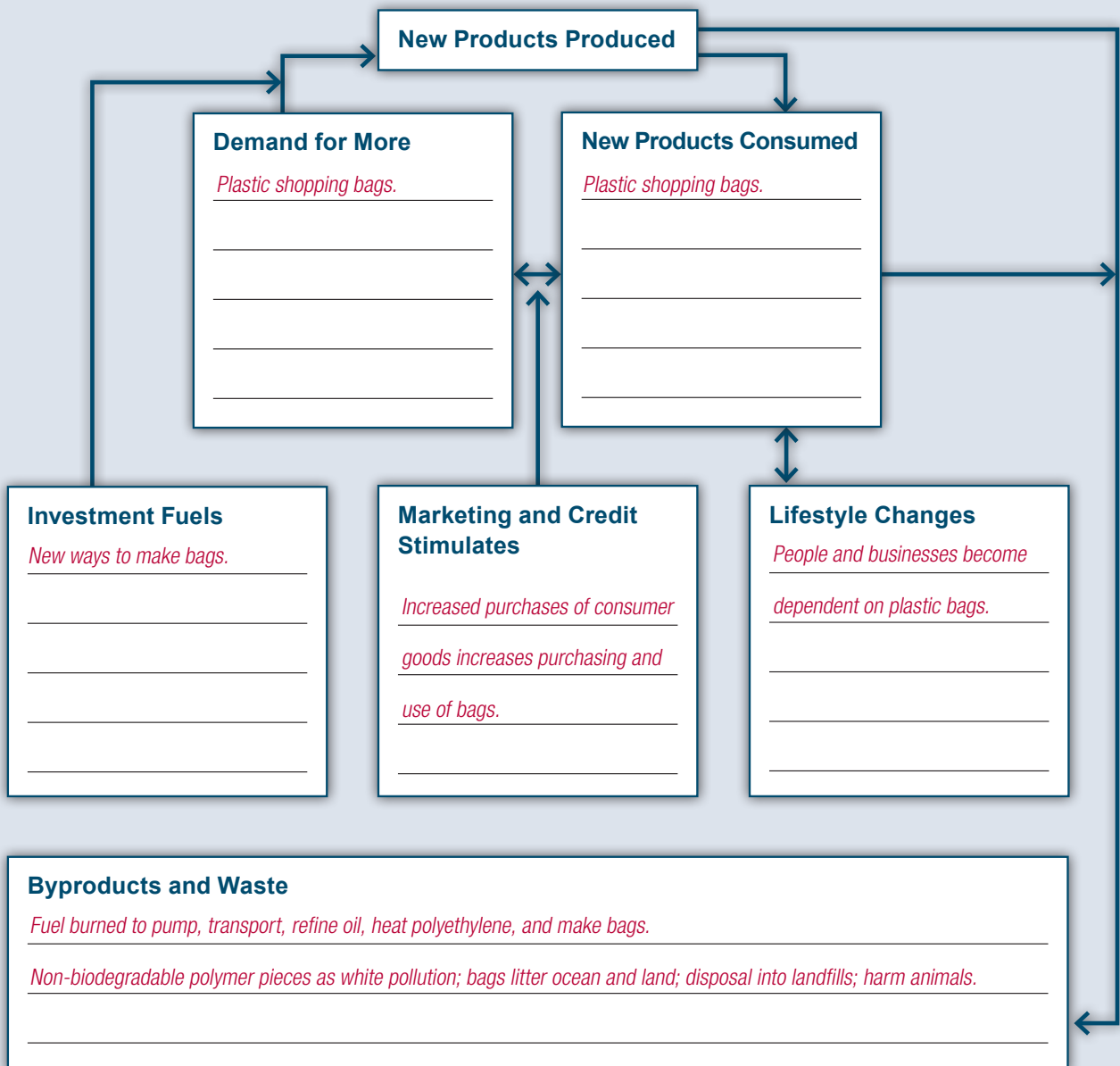


### Materials and Resources

*Polyethylene from petroleum and  
natural gas.*

## Answer Key and Sample Answers

## VA #17 Mass Production, Marketing, and Consumption: Part 2





# Lesson Assessment

## Description

**Mass Production, Marketing, and Consumption of Plastic Shopping Bags** (Student Workbook, pages 14–17) assesses students’ achievement of the learning objectives: “Identify the relationship between mass production techniques and the consumption of natural resources; the rates of consumption of manufactured goods; and the production of byproducts that may have detrimental, beneficial, or neutral effects on natural systems” and “Provide examples of the direct and indirect effects of new technologies (for example, automobiles, electricity) on natural systems (for example, consumption of land for transportation systems, release of toxic and nontoxic byproducts and waste materials).” To demonstrate what they have learned, students complete a flowchart and provide written responses to questions.

## Suggested Scoring

An Answer Key and Sample Answers for **Mass Production, Marketing, and Consumption of Plastic Shopping Bags** are provided on pages 115–118. There are 42 total points possible.

## Answer Key and Sample Answers

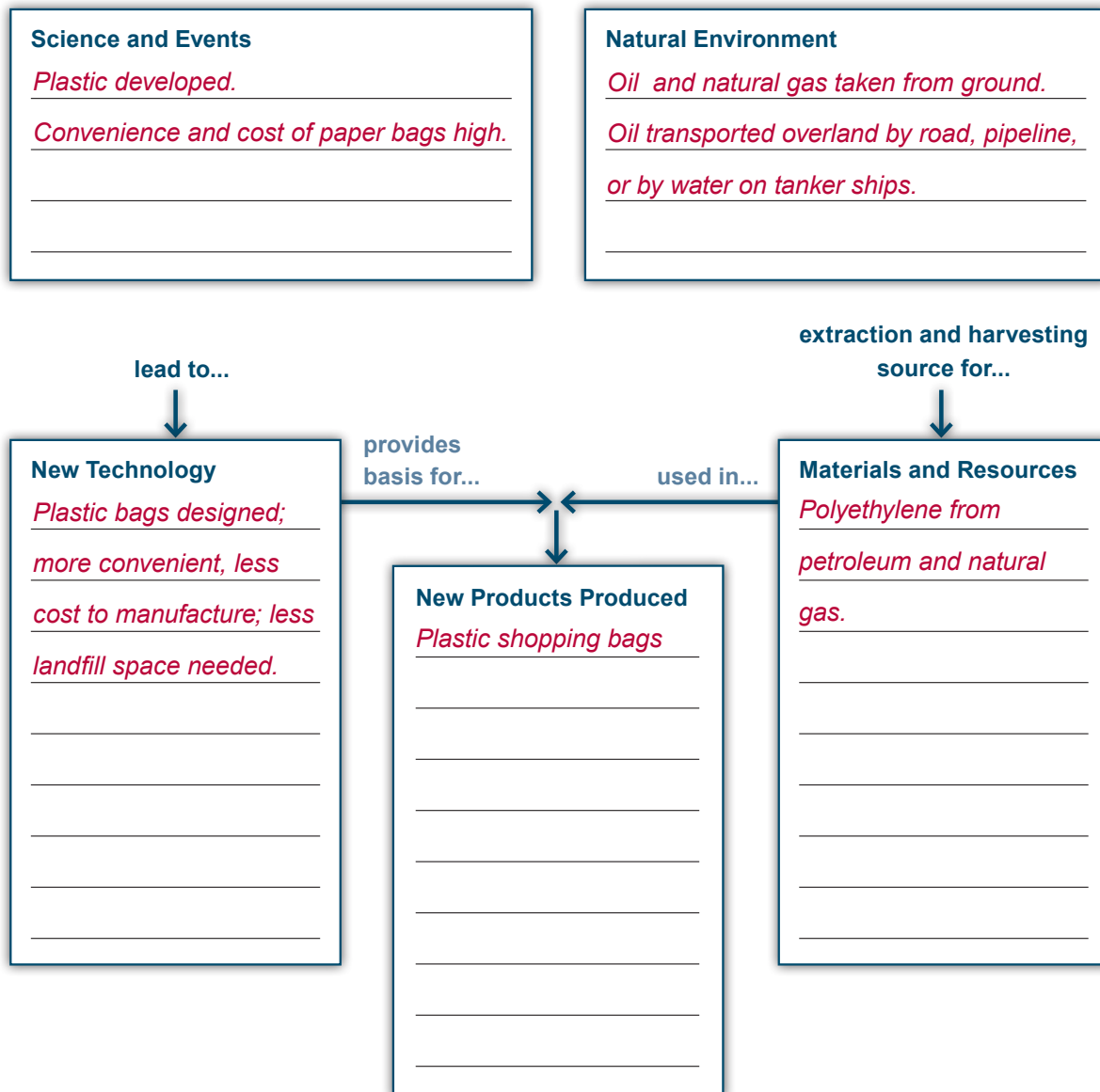
## Mass Production, Marketing, and Consumption of Plastic Shopping Bags

Lesson 5 | page 1 of 4

Name: \_\_\_\_\_

## Part 1

**Instructions:** Use the information in today's lesson to fill in the spaces on the flowchart below (and on the next page) about the mass production, marketing, and consumption of plastic shopping bags. (2 points each box)

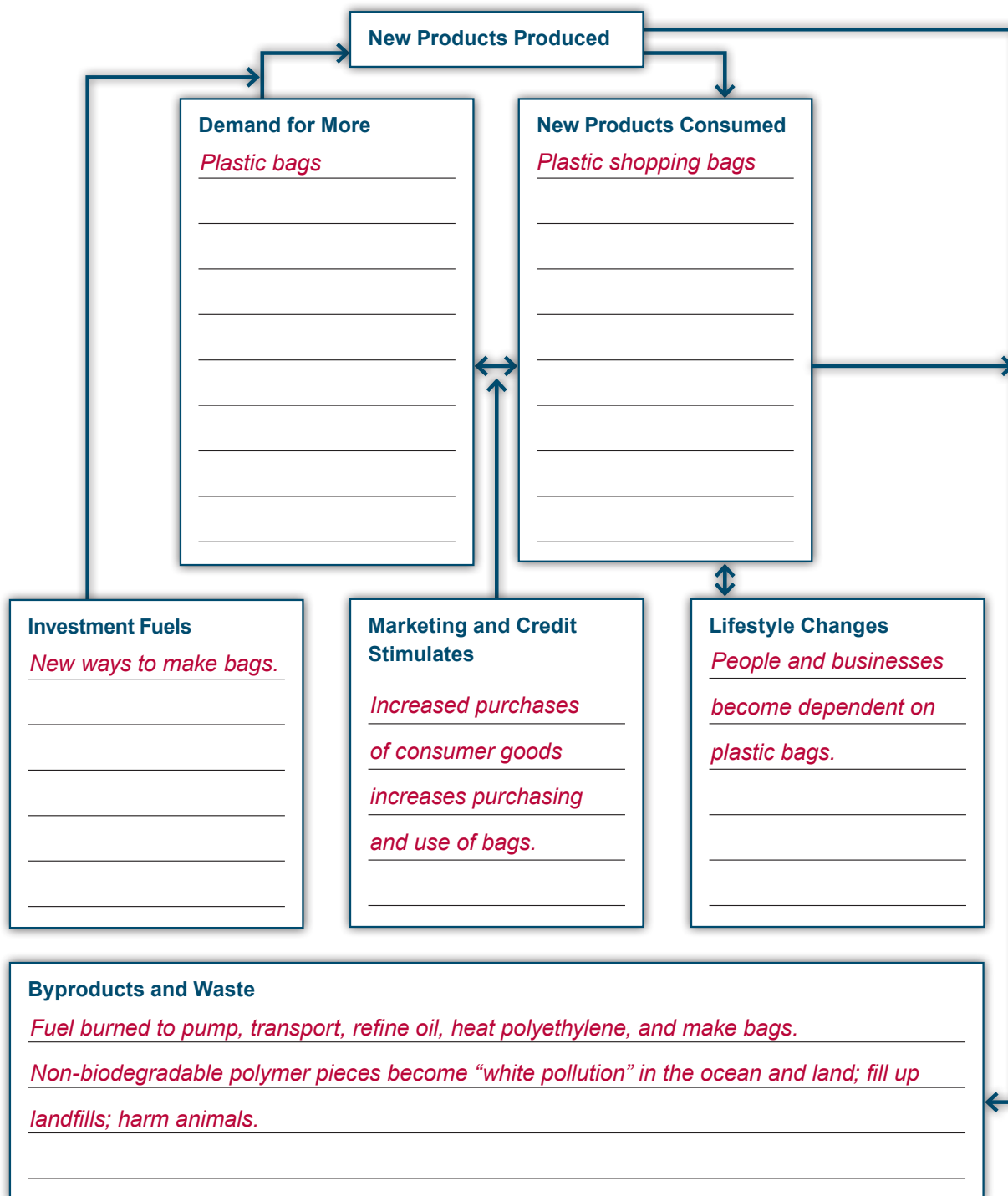


## Answer Key and Sample Answers

### Mass Production, Marketing, and Consumption of Plastic Shopping Bags

Lesson 5 | page 2 of 4

Name: \_\_\_\_\_





## Answer Key and Sample Answers

## Mass Production, Marketing, and Consumption of Plastic Shopping Bags

Lesson 5 | page 3 of 4

Name: \_\_\_\_\_

## Part 2

**Instructions:** Discuss the following questions with your partner and then write an answer for each.  
(5 points each)

1. What are the advantages of using plastic shopping bags?

*Plastic shopping bags are very convenient to use. They take less energy to manufacture than paper bags, cost less to transport, and can be reused.*

2. How does the production of plastic shopping bags affect natural systems?

*The production of plastic shopping bags harms natural systems. Nonrenewable natural resources—oil and natural gas—are used to manufacture these bags, and these resources are in short supply. In addition, discarded bags, if not recycled or disposed of properly, can become litter on the land and in the ocean. Plastic bags have harmed many marine animals. Millions of these bags occupy landfill space after only being used once or twice. As consumers use more bags each day, manufacturers make more to replace those that have been thrown away.*

Mass Production, Marketing, and Consumption of Plastic Shopping Bags

Lesson 5 | page 4 of 4

Name: \_\_\_\_\_

3. What might be done to change the cycle of mass production, marketing, and consumption of plastic bags?

*New technologies could recycle disposed materials in an inexpensive manner to create sturdy, affordable, convenient bags instead of plastic shopping bags. This way, natural systems would benefit from less waste going into landfills. Oil and natural gas would no longer be needed to make the plastic bags. Marketing efforts could present these reusable bags as a great alternative and create demand for recycled-material bags as the solution for future generations. Consumers could be convinced about the importance of reusing and recycling plastic bags.*

4. What is the government doing to manage concerns about plastic bags via regulation, incentives, and/or new technologies?

*Local, state, and federal agencies are offering incentives to develop alternatives to plastic shopping bags. Some cities have put a fee on using plastic bags, or have banned the use of plastic bags altogether. The government is also funding advertisements to teach the public about the environmental concerns of plastic bags.*

12

**“White Pollution” in Beijing**

Visual Aid

**VA #12 “White Pollution” in Beijing**



13

### Plastic Bag or Jellyfish?

Visual Aid

#### VA #13 Plastic Bag or Jellyfish?

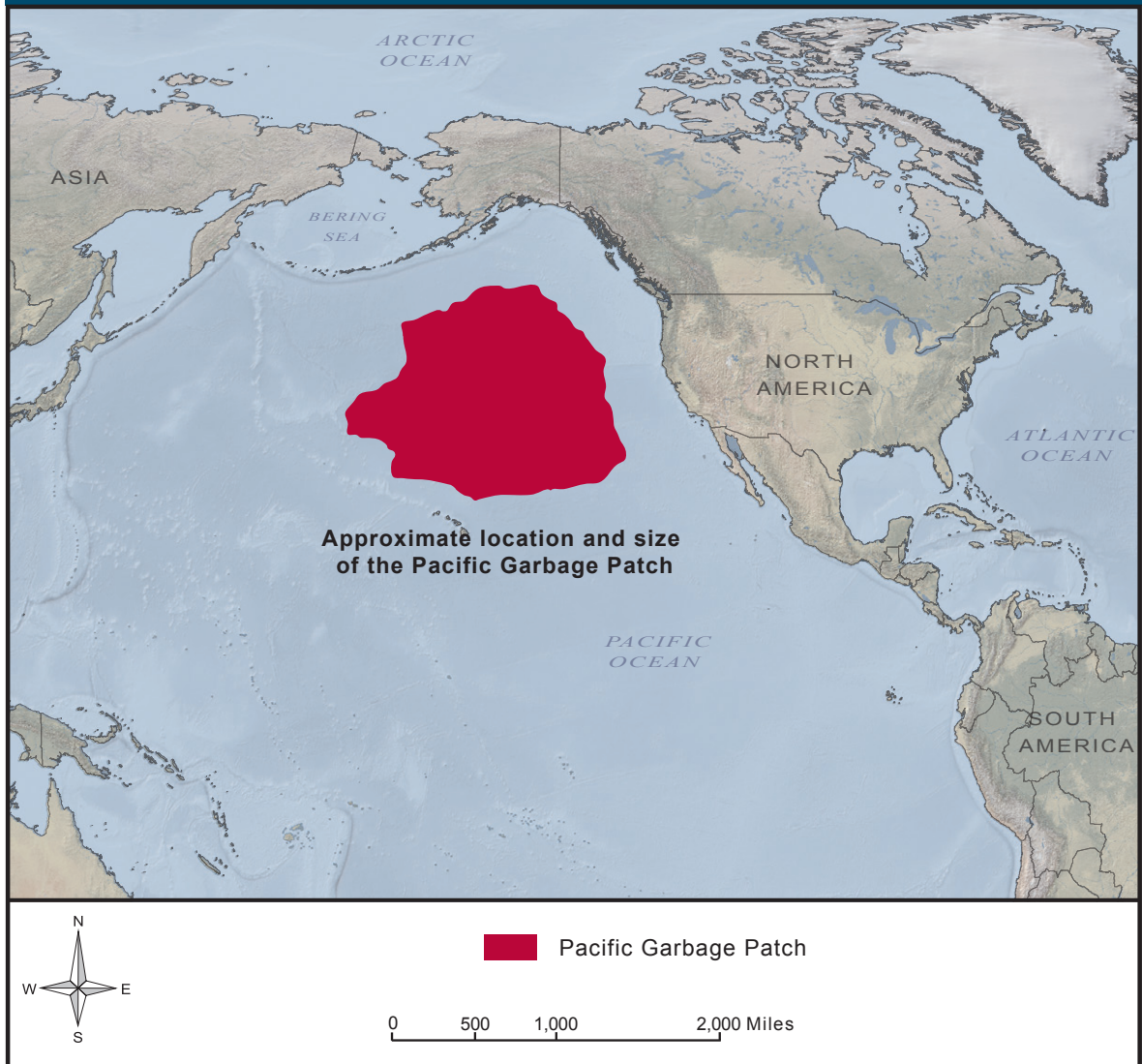


14

## Pacific Garbage Patch

Visual Aid

## VA #14 Pacific Garbage Patch





15

## "White Pollution" in the Marine Environment

Visual Aid

### VA #15 "White Pollution" in the Marine Environment



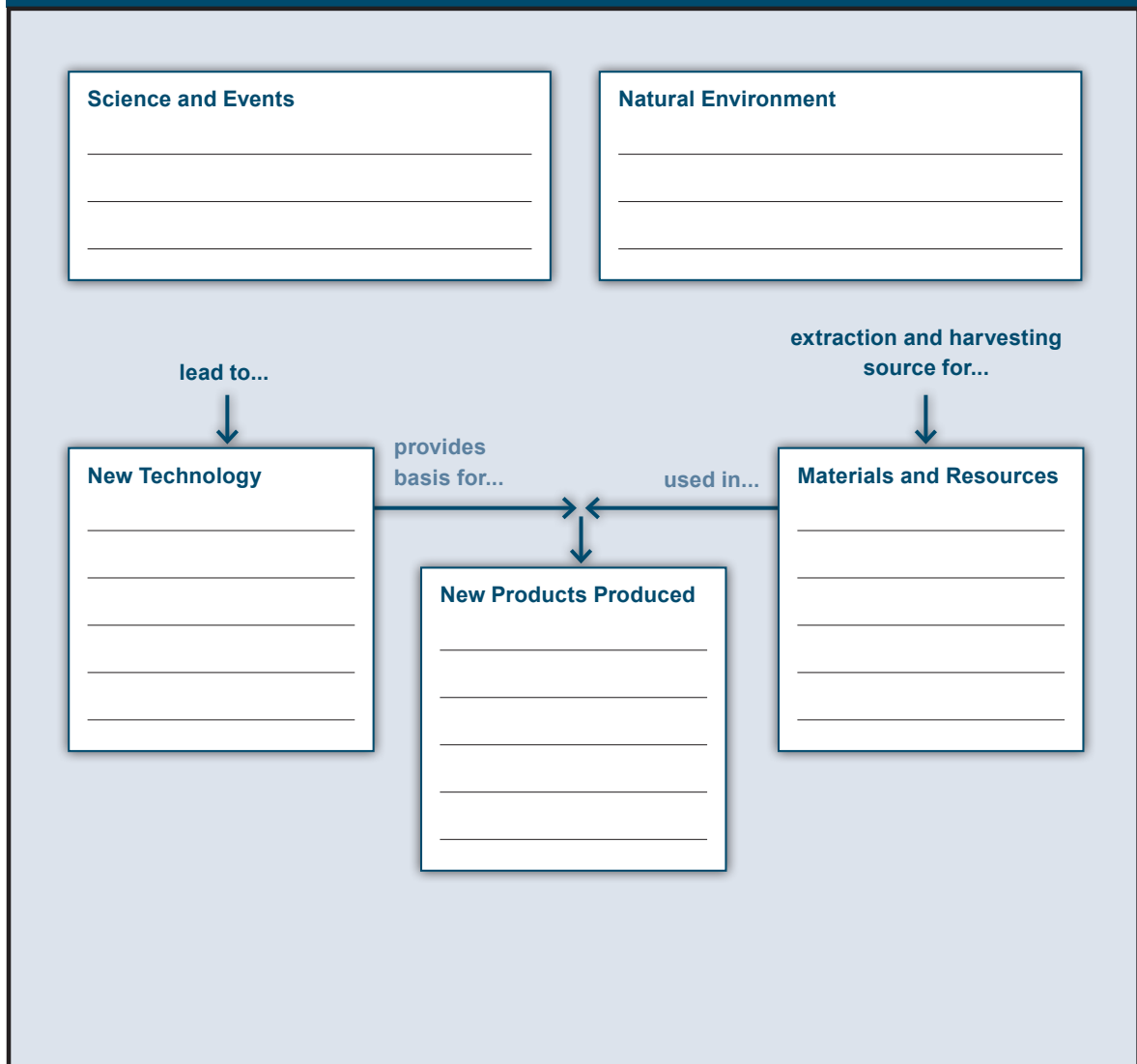


16

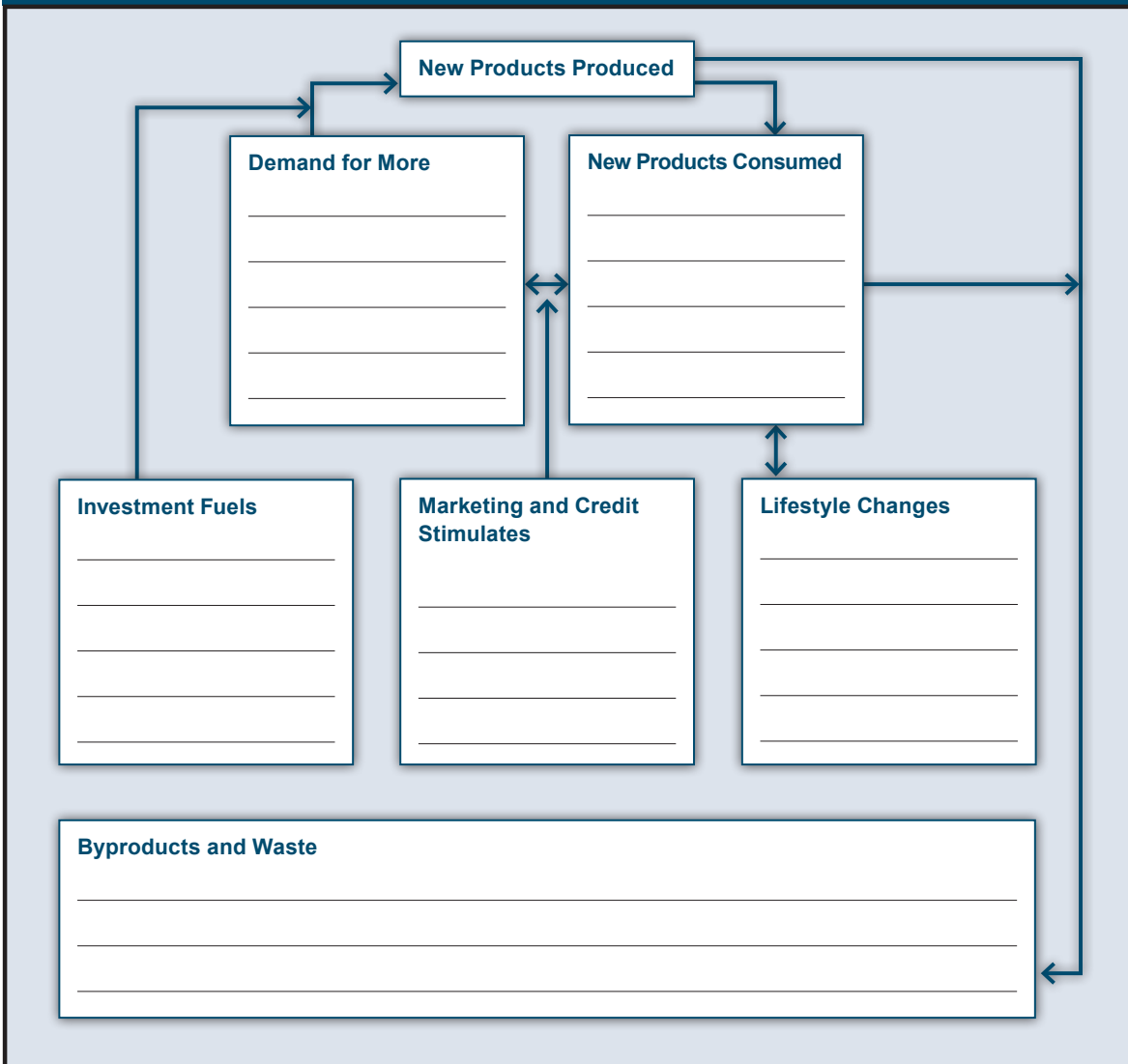
## Mass Production, Marketing, and Consumption: Part 1

Visual Aid

## VA #16 Mass Production, Marketing, and Consumption: Part 1



## VA #17 Mass Production, Marketing, and Consumption: Part 2



# Acknowledgements

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Page 78	Canned food advertisement – Del Monte/Wikipedia.org
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Page 99	Orange County landscape, 2009 – Adapted by Jess Huggins/Uptown Studios, from original by Robin Dennis/Flickr.com
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### Maps

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### Photos

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Page 66	Shoppers at storefront, 1922 – Herbert A. French/Library of Congress Prints and Photographs Division
Page 67	Car assembly line – Detroit Publishing Company/Library of Congress Prints and Photographs Division Woman adjusting radio, ca. 1920 – National Photo Company Collection/Library of Congress Prints and Photographs Division
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Page 122	White pollution in the marine environment – Tyrone Turner/National Geographic Society

## Information Cards

### Illustrations

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## Student Edition

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## Maps

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